ENGINEERING NEWS-RECORD

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MARCH 31, 1960

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CONTENTS ON PAGE 15

- Are we afraid of high buttress dams? p.30
- The longest prestressed span in the U. S. p.38

AGC's Volpe: He's bidding on a big state job p.57

A McGRAW-HILL PUBLICATION

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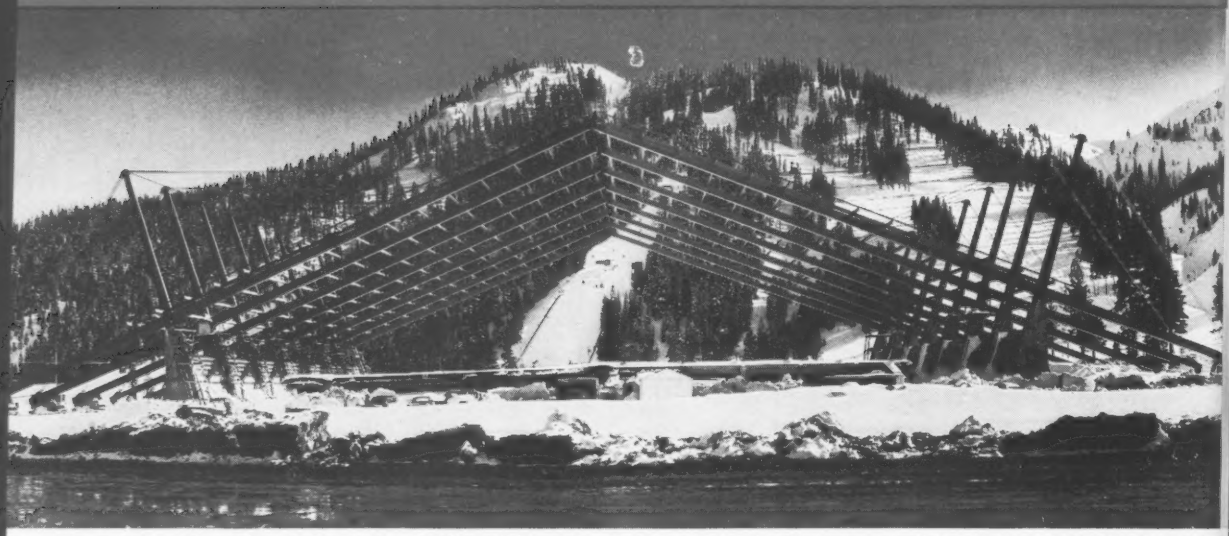
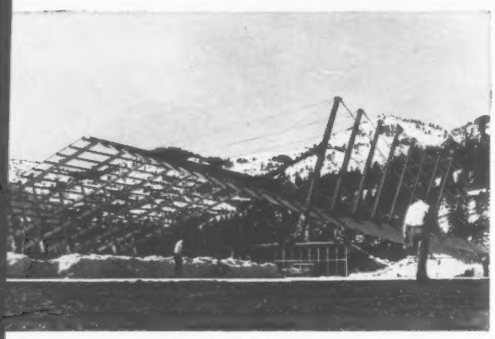
typically **PDM—**

AT Squaw Valley CAL.



Construction views of Ice Arena, looking northward. Arena is open to sun on south side, facing speed skating oval and ice hockey rinks.



"The building that's built like a bridge" aptly describes the spectacular Ice Arena at Squaw Valley, California. A focal point of the 1960 Winter Olympics, and a key element of one of the world's greatest sports centers, this unique structure features a roof suspended from 96 heavy cables, with main frame affording a 300 ft clear span.

Typically PDM in quality of fabrication and erection, the 1098 tons of structural steel include tapered steel columns, tapered steel box girders, and inclined steel tension members. Rolled steel beam purlins between main frame girders carry the steel deck roof. Each half of the roof is independently supported, bridge-like and striking in appearance.

This difficult job was handled in stride by PDM on an exacting schedule with traditional fine craftsmanship. • Do you have a steel construction problem coming up?

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Plants at **PITTSBURGH, WARREN, BRISTOL, PA. • BALTIMORE • BIRMINGHAM • DES MOINES PROVO, UTAH • CASPER, WYO. • SANTA CLARA, FRESNO, STOCKTON, CALIF.**

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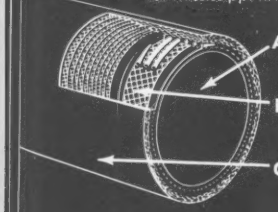
GOODYEAR INDUSTRIAL PRODUCTS GTM-Specified

Special 38" Sand Suction Hose for Mississippi River dredging



A Tube of super-tough stock to withstand razor-sharp wet sand

B Reinforcements of heavy wrapped fabric plies plus high-strength spiraled wire

C Heavy gauge cover resistant to gouging and scuffing.

Leave it to the G.T.M. to come up with the answer when recurring failures of any industrial rubber product are hampering a key operation.

He and the Goodyear Distributor make a specialty of doing just that—whether the need is for V-Belts, Conveyor Belting or any other industrial product. Just look under "Rubber Goods" or "Rubber Products" in the Yellow Pages. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

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GOODYEAR

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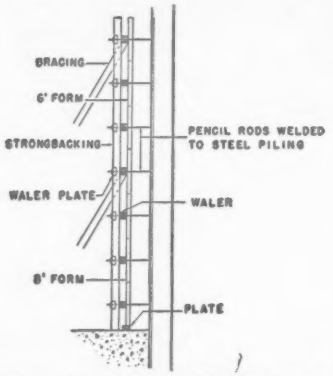
Best Method to Pour 750 Ft. Retaining Wall

Symons Forms, Sheet Piling and Pencil Rod Ties

How to pour a 750 foot lake retaining wall with thickness from 12 to 20 inches and 13 ft. high, faster and more economical. S. N. Nielsen Construction Company, Chicago, had that problem on a 600 unit apartment on Lake Michigan shoreline. Since a fixed core



could not be obtained while using sheet piling only, the superintendent used Symons Steel-Ply Forms with sheet piling and pencil rods as ties.

Was this method a success? After 250 feet of wall had been formed, poured and stripped, the forming costs were computed at 12 cents a square foot.

Contractors are finding almost as many uses for Symons Forms as there are jobs to bid on. It will pay you to send for our FREE form literature. And Symons Forms can be rented with purchase option.

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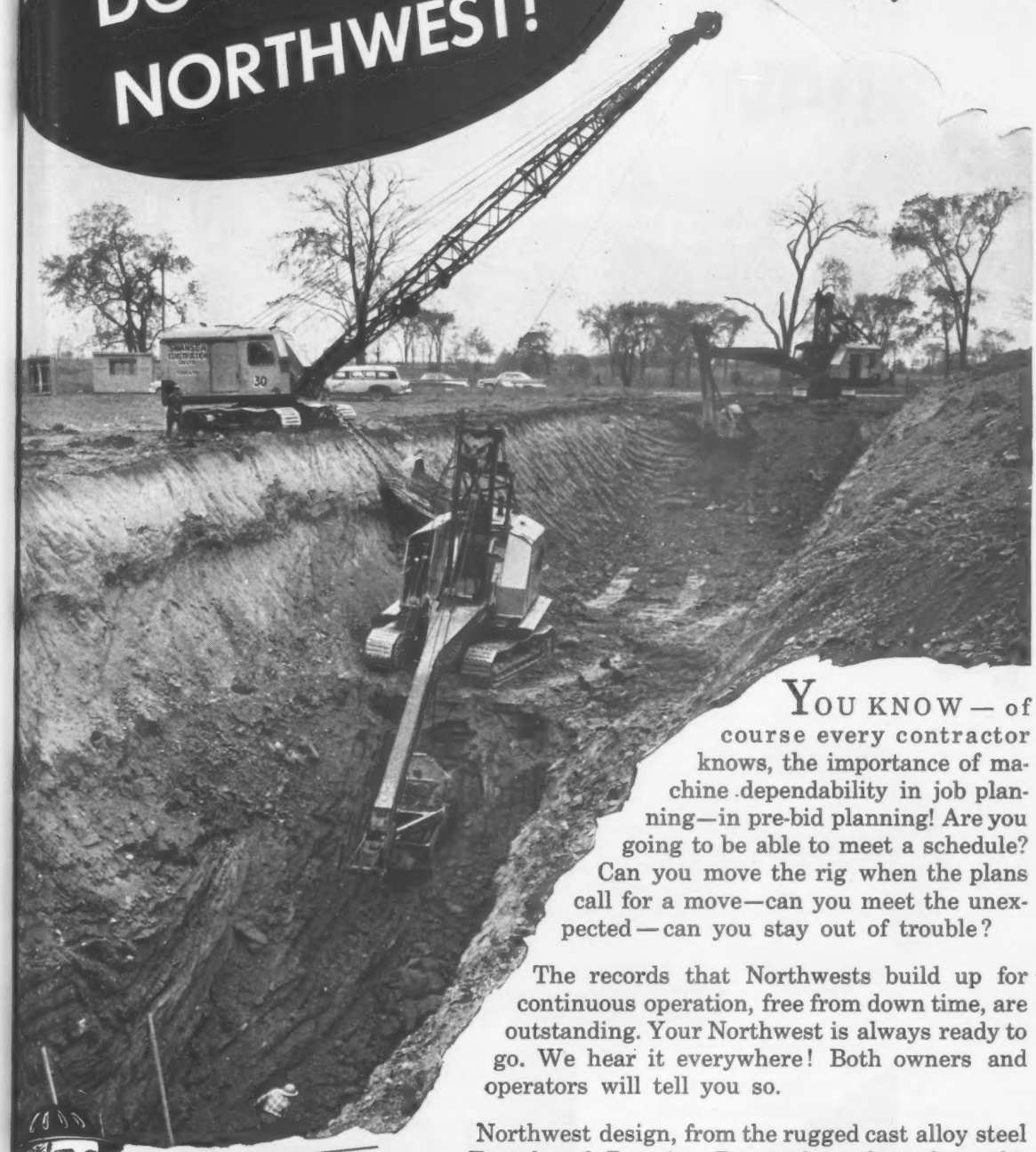


YOU KNOW — of course every contractor knows, the importance of machine dependability in job planning—in pre-bid planning! Are you going to be able to meet a schedule? Can you move the rig when the plans call for a move—can you meet the unexpected—can you stay out of trouble?

The records that Northwests build up for continuous operation, free from down time, are outstanding. Your Northwest is always ready to go. We hear it everywhere! Both owners and operators will tell you so.

Northwest design, from the rugged cast alloy steel Travel and Rotating Bases clear through to the tip of the dipper, bring you the dependability that assures carrying a job through on schedule.

Northwests get the job done!

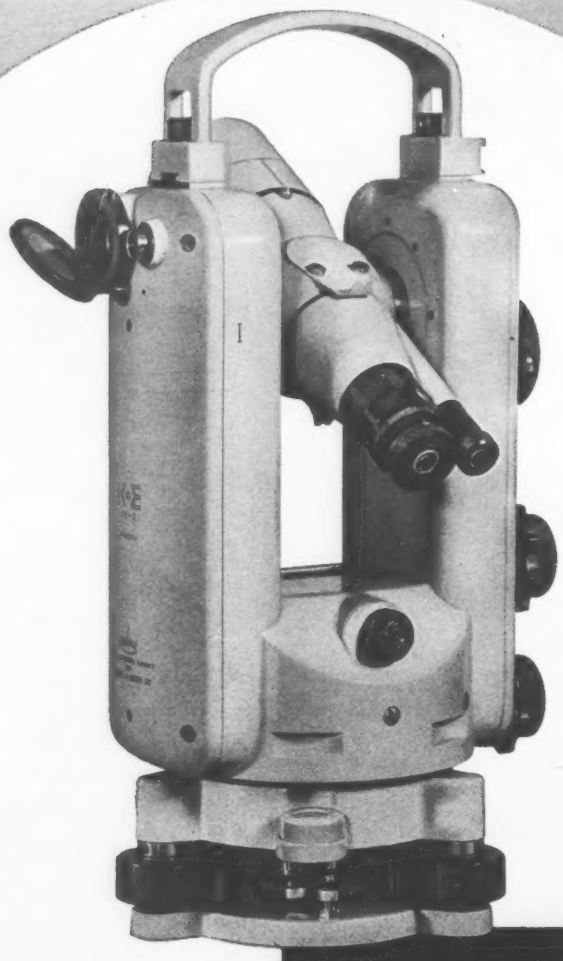
Let a Northwest man tell you in detail about the many Northwest advantages.

NORTHWEST ENGINEERING COMPANY

THEODOLITES

now THEODOLITES ...

by K+E



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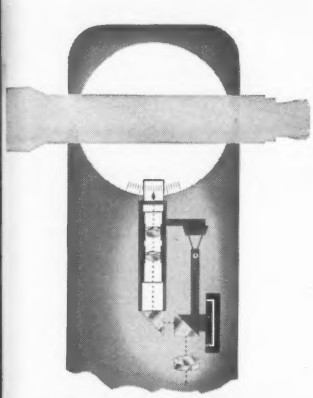
The KE-2, reading direct to one second

The KE-1, reading direct to 20 seconds

The KE-6, reading direct to one minute

In performance and manufacturing excellence, we at K&E regard these theodolites as among the major achievements in our 93 years of instrument experience. They are built in Germany to K&E specifications and standards by world famous Askania-Werke AG.

Engineered For American Practice



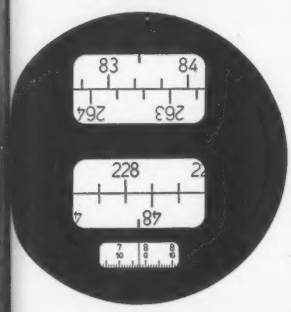
SPEED AND ACCURACY

A built-in pendulum system provides automatic indexing of the vertical circle thereby eliminating an operating step necessary with other design systems. By removing the need to check and re-check a vertical control level, K&E Theodolites are not only faster to use, but far less prone to reading errors caused by drifts in a level.

Theodolites designed in Europe, even those widely used in the United States and Canada, have inherently reflected the patterns of European engineering practice. K&E Theodolites however, embody a *new* set of concepts. These three K&E models are the first and only optical reading instruments of this type conforming to American practice. Seven major improvements—a combination exclusive with K&E—characterize the line:

• **Automatic indexing of vertical circle** . . . pendulum system eliminates need for vertical control level, assures accurate vertical angles. • **Choice of erected or inverted image** . . . with either, telescope plunges through both objective and eyepiece ends. • **Leveling head joint system** . . . ball and socket linkage prevents shift between plates, gives instrument a permanently rigid leveling base. • **All control knobs located on one side** . . . for rapid, one-hand operation. • **Simultaneous viewing of both circles** . . . provides faster, easier reading, eliminates the need to switch-over from one circle to the other. • **Optical plummet built into the alidade** . . . affords easy checking simply by rotating 180°. • **Fully interchangeable accessories** . . . designed to work with all K&E Theodolites, eliminating costly duplication.

Model KE-2

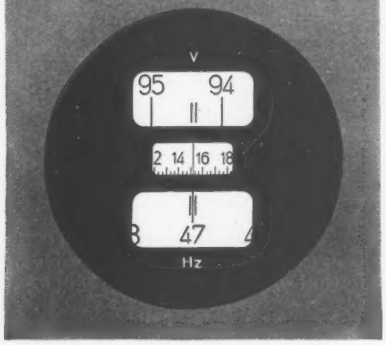


izontal Reading — 228° 17′ 57.6″

Directional Theodolite

- direct reading — 1 second
- estimation — 0.1 second

Model KE-1

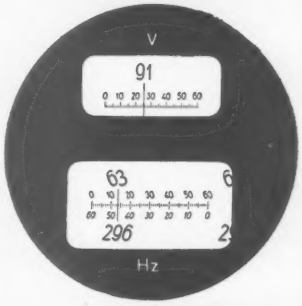


Horizontal Reading — 47° 15′ 12″

Repeating Theodolite—Zero setting

- direct reading — 20 seconds
- estimation — 2 seconds

Model KE-6



Horizontal Reading: clockwise — 63° 13.6′, counter clockwise — 296° 46.4′
vertical reading — 91° 25.4′

Repeating Theodolite—Zero setting

(comparable in operation and performance to the standard American transit)

- direct reading — 1 minute
- estimation — 6 seconds
- horizontal circle graduated 360° in both directions

K&E Theodolites are available for immediate shipment in the United States and Canada. Contact your nearest K&E dealer for information — or write directly to Dept. EN-3, Hoboken, N. J., for descriptive literature.

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Reader Comment

Soil Heave and Pyrites

SIR—I noticed your interesting article about expansive iron pyrite causing heaving of some structures in the Cleveland area (ENR Feb. 4, p. 46). Your readers may be interested in a similar problem in the Chicago area, and the methods of solution.

About three years ago we were retained by the Chicago Housing Authority to investigate, and correct, a condition in several of their buildings which had caused considerable heaving in the slabs and crushing of partitions.

Investigation revealed that a boiler slag had been used for the project to fill to the underside of the ground floor slab. This fill was about 4 ft thick. This material contained considerable amounts of ferrous sulphide, commonly called iron pyrite. At that time, unaware of the work in Cleveland, we had also reported that the cause of the heaving was oxidation of the ferrous sulphide and subsequent hydration.

Corrective measures involved inserting numerous pipes horizontally through the fill and leaching clear water through the fill to wash out the soluble sulphates and sulphides. We measured the concentration of sulphides and sulphates in the effluent, and continued the leaching until the concentration diminished. Chemical solutions were then injected to increase the solubility and further reduce the amount of sulphates in the fill. Finally, the entire fill was grouted with sulphate-resistant cement grout.

The purpose of the grout was fourfold: to fill voids within the fill and beneath the slab resulting from loss of volume due to leaching; to keep further air from entering the fill; to keep water from entering the fill; and finally, to prevent further heaving by providing an internal resistance against volume change through the tensile strength of the grout. Time has proved the procedure successful.

JOHN P. GNAEDINGER
Soil Testing Services, Inc.
Chicago, Ill.

▶ Heave resulting from the oxidation of pyrite found as crystals in shales (ENR Feb. 4, p. 46) has been experienced in the St. Louis area.

One example is in a shopping center built during the latter part of 1940. After about 10 years, the heave was so

(*Reader Comment continued p. 12*)

Engineering News-Record welcomes expression of opinions from its readers. Comment should be as brief as possible and pertinent to subjects of current construction importance. Letters should be addressed Editor, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

28 miles at sea—

RAYKAY 1

Code name for a Raymond joint venture, Raykay 1 is the unique deep-water oil loading depot now being built 28 miles offshore in the Persian Gulf. It is scheduled for completion about March 1961, and is designed to speed Iraq's oil exports by eliminating congestion at the port.

A $15,000,000 project

This great terminal literally took off eight months ago, when it floated out from England behind a towline that would eventually carry it 7,000 miles to its final berth.

Twelve hundred feet long and complete with heliport and air conditioned crew quarters, Raykay 1 will be linked to Fao, its source of supply, by two 32-inch submarine pipelines. Two 65,000-ton tankers at a time will be able to load without having to navigate the shallow waters of the river leading to the present port. And the creative engineering of Raymond International is helping to make this possible.

Whatever your offshore problems, no matter how deep or distant, take advantage of Raymond's experience in many seas, in many parts of the world. We have the knowledge and the equipment, and we'd like to help. Write or call any of Raymond's offices throughout the world.

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Built for the Basrah Petroleum Company, a group of British, Dutch, French and American oil interests.
Engineers: Rendel, Palmer & Tritton (London)

"We carry up to 2,500 lb. mor ay FORD Tandems and still outru th

SAYS HARRY R. KUNZ
PRESIDENT, KUNZ PAVING CO.
SAN MATEO, CALIFORNIA

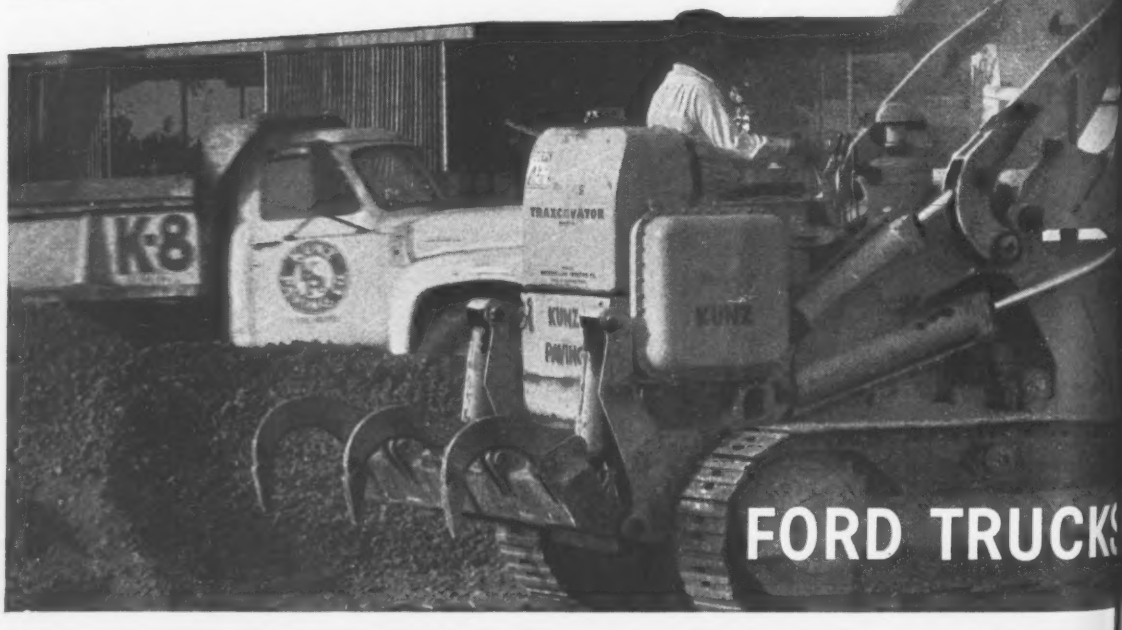
Mr. Harry R. Kunz, a Registered Public Accountant in the construction field for 20 years, started the Kunz Paving Company in 1954. He and his two sons, Harry Jr. and Gerald, expect to do $500,000 worth of work with their fleet of 16 Ford Trucks this year. Here is what he has to say about these trucks.

"Our experience with Fords has proved them to be the best all-around truck we can buy! They haul more payload, cut down considerably on trip time and cost less to operate and maintain.

"The lighter chassis weight of the Ford Tandems lets us carry as much as 2,500 pounds more than competitive makes. This extra payload means that we can haul as much in ten trips as the others do in eleven. Our Fords will beat them on a trip-for-trip basis, too!

"On a 30-mile haul, our '59 T-800 equipped with Transmatic Drive will lap other trucks on the same job every fourth trip. This not only reduces our hauling costs but it makes our Ford's more attractive as rental units for other contractors. One of our associates had two of his trucks and two of our Fords working on the same job. He actually paid for the rental of our trucks by the extra trips they made.

"Our cost records, set up on an hourly basis to make it easier to prepare bids, show that the longer life built into Ford Trucks makes them less costly to operate. We have one '56 Ford T-750 with over 100,000 miles on it that we use as a base for our tandem hauling costs. In spite of its high mileage – gas, oil, tires, maintenance and repairs amount to only $2.08 per hour. Facts and figures like these keep us sold on Ford Trucks for our business."



FORD TRUCKS CO

...ayload on our ...ther trucks on the same job!"

Again in '60... FORD PICKUPS beat all leading makes in Gasoline Economy!

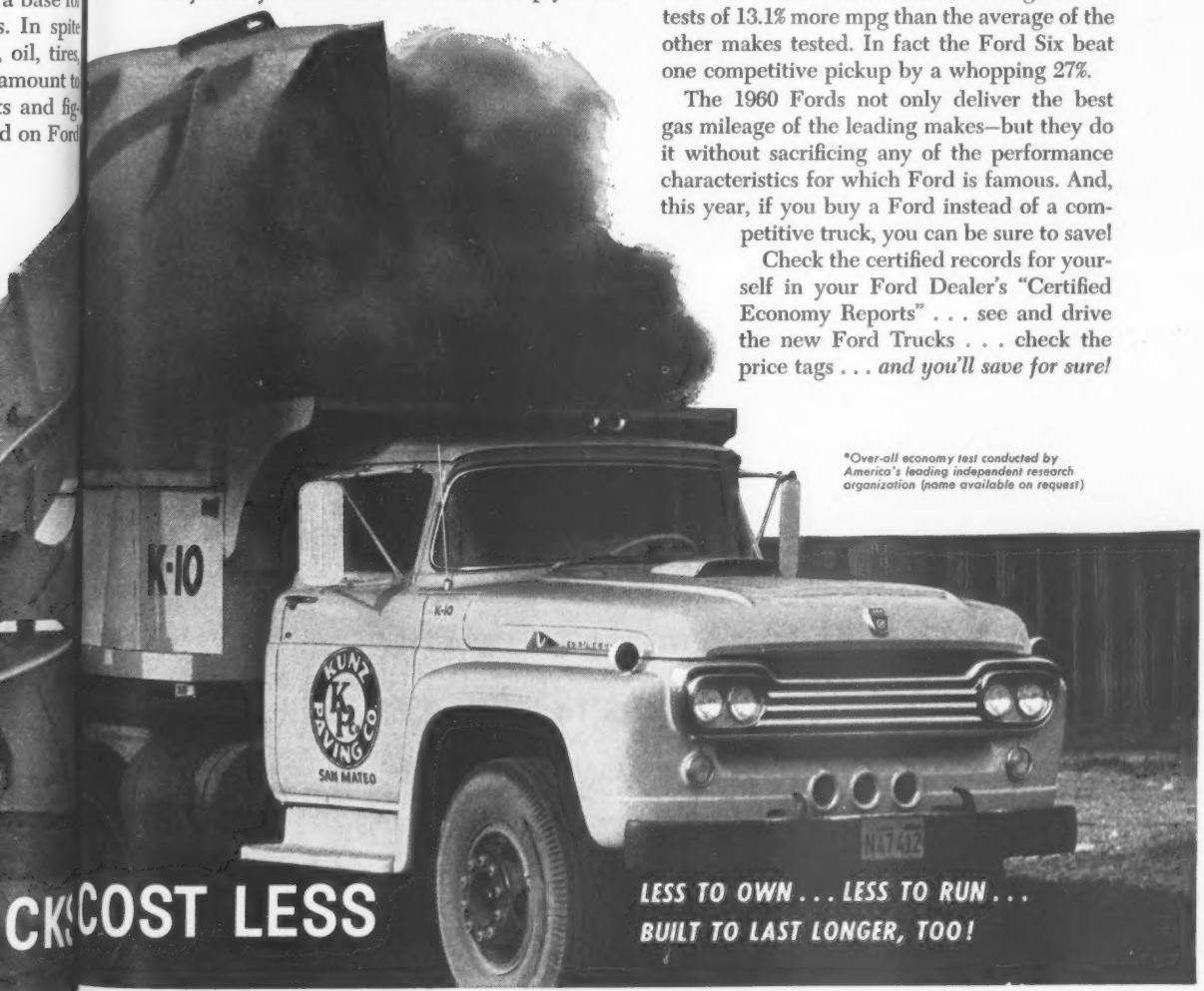
Ford Six delivers 13.1% better gas mileage in second running of Economy Showdown U.S.A.* Standard 1960 ½-ton pickups of the five leading makes were purchased from dealers just as you would and run both empty and loaded, over flat terrain and hills, at low and high speeds, under city traffic and retail delivery conditions.

Certified results show the Ford Six won *every* test—with a combined Ford advantage for all tests of 13.1% more mpg than the average of the other makes tested. In fact the Ford Six beat one competitive pickup by a whopping 27%.

The 1960 Fords not only deliver the best gas mileage of the leading makes—but they do it without sacrificing any of the performance characteristics for which Ford is famous. And, this year, if you buy a Ford instead of a competitive truck, you can be sure to save!

Check the certified records for yourself in your Ford Dealer's "Certified Economy Reports" . . . see and drive the new Ford Trucks . . . check the price tags . . . *and you'll save for sure!*

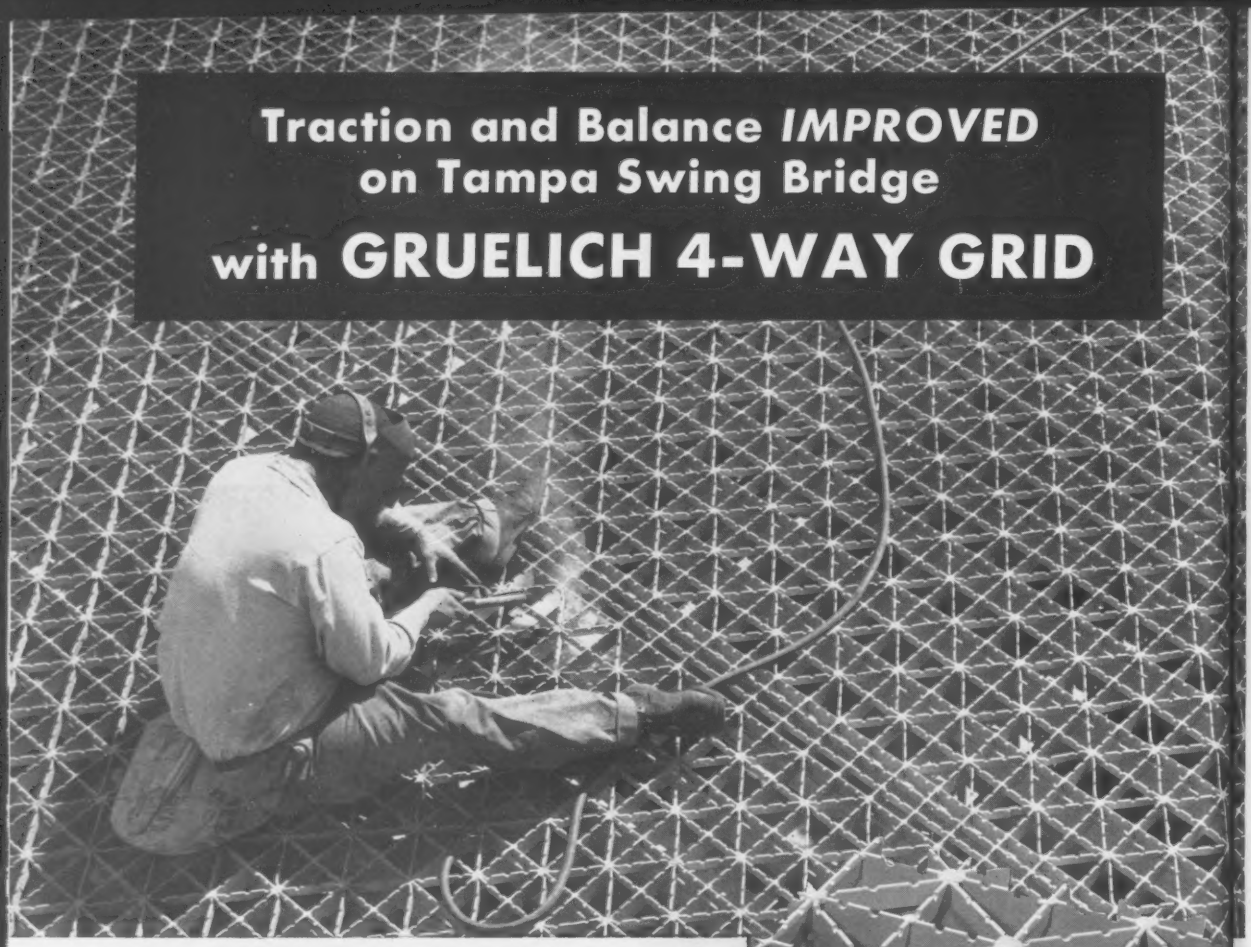
*Over-all economy test conducted by America's leading independent research organization (name available on request)



...COST LESS

LESS TO OWN . . . LESS TO RUN . . .
BUILT TO LAST LONGER, TOO!

Traction and Balance *IMPROVED* on Tampa Swing Bridge with GRUELICH 4-WAY GRID

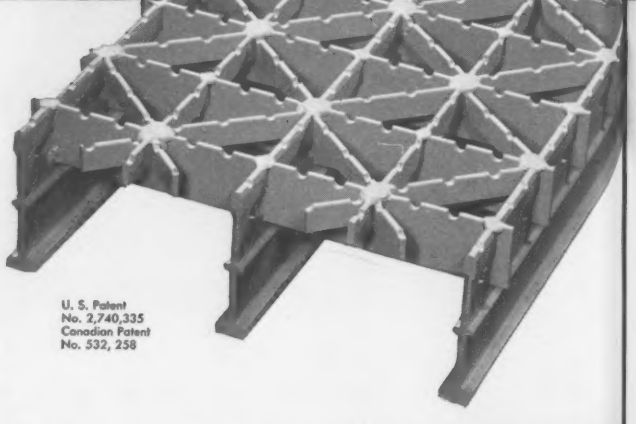


Greulich 4-Way Grid panels being welded to supporting beams. Note true alignment of panels.

Now STRONGER . . . MORE RIGID!

Recently, 5-inch deep Greulich 4-Way Grid open steel bridge flooring was installed to replace the second timber deck on the City of Tampa's Columbus Drive bridge over the Hillsborough River.

To balance the span originally, a lighter roadway deck was required on the long arm and timber was used for this purpose. Again in 1936, timber was used. However, in the Fall of 1959 Greulich 4-Way Grid was installed because its weight so nearly equaled that of the timber floor that the span was easily balanced by the addition of some concrete filling which also served to protect machinery below. The former timber deck absorbed so much water that the balance required to open and close the span was disturbed. Now, with the installation of Greulich 4-Way Grid, this condition has been eliminated and traction so improved over the old timber floor that the danger of skidding is greatly reduced.



U. S. Patent
No. 2,740,335
Canadian Patent
No. 532, 258

Quick Facts about GREULICH 4-WAY GRID

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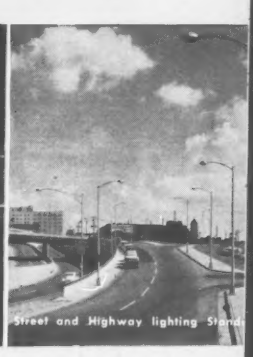

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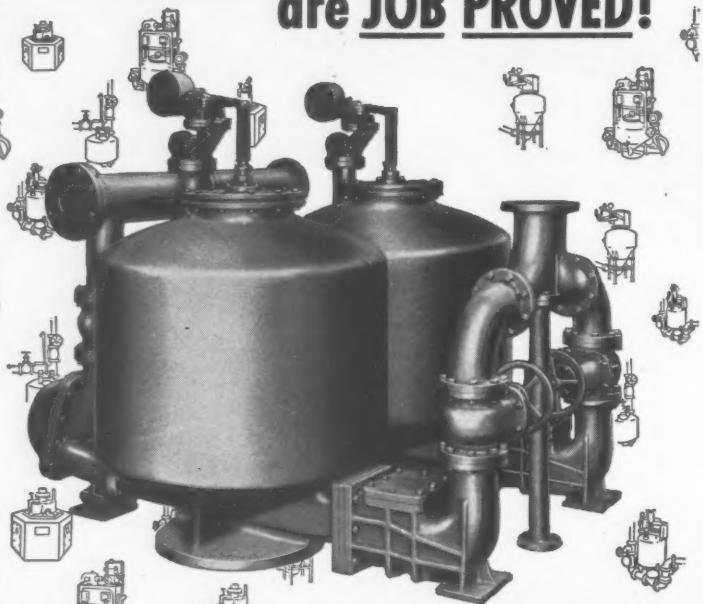

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. . . Reader Comment

great that the owner had test pits dug in an attempt to find the cause and determine corrective measures.

Examination of the test pit walls revealed the presence of a salt formation and showed a general orientation of crystal and lens growth similar to that of frost heave. The salt was identified as melanterite, a hydrated ferric sulfide.

In the St. Louis area, it appears that melanterite is scattered throughout a 1½ to 3-ft-thick indurated stratum, which locally is called shale. The undisturbed material has a dry density ranging from 130 to 145 psf.

An analysis of the disturbed soil showed it to be very dry and indicated that the crystalline growth took place in material with a moisture content of less than 5%.

For this particular building, the solution lay in construction of a new floor, and in some places, by the removal of the troublesome layer.

HENRY M. REITZ
Consulting Civil Engineer
St. Louis, Mo.

Missiles on Railroads

SIR—Your editorial concerning the confusion on bridge clearances for the Interstate Highway System (ENR March 3, 1960, p. 92) unfortunately overlooks one basic issue. No one has yet explained why missiles, or their supporting equipment, must be handled on the Interstate roads.

This country already has a vast network of roads—*rail*roads, that is—which right now provide far better clearances than the 16-ft minimum to be provided eventually by the Interstate highways. This past winter has shown that even the most modern thruways can be tied up by weather, which has little effect on rail traffic.

It is no secret that the Minuteman solid-fueled ICBM will be not only transported by rail, but will even be fired from roving missile trains. Why, then, spend almost a billion dollars improving Interstate clearances? Surely the money could be put to better use in the missile program itself.

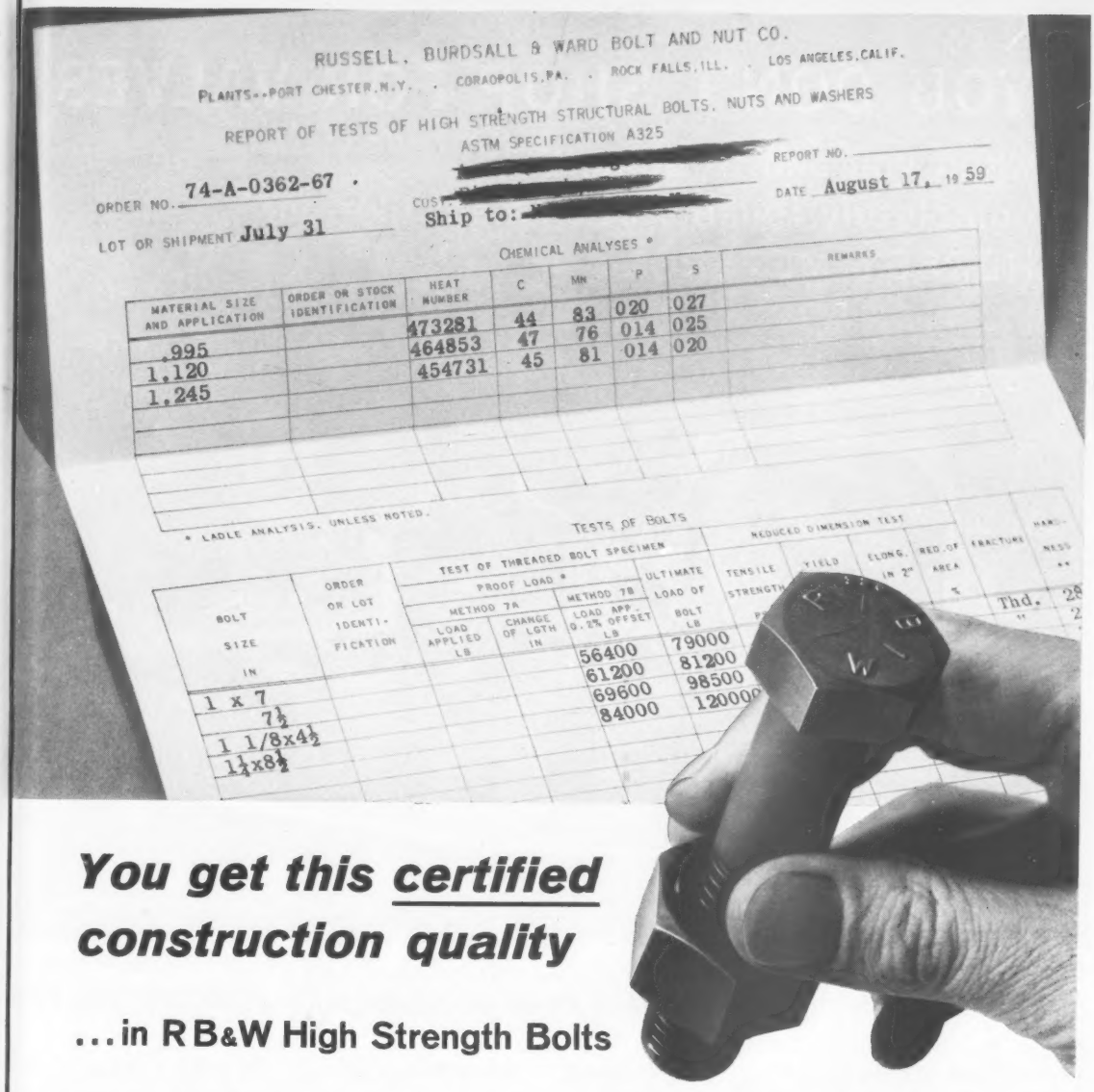
J. W. DAVIDSON
Engineer of Bridges
Chicago, Burlington & Quincy Railroad Co.
Chicago, Ill.

For Your Calendar . . .

1960 Nuclear Congress and Atomic Exposition, New York Coliseum, New York, N. Y., Apr. 4-7. Write: Atomic Exposition, 117 South 17th St., Philadelphia 3, Pa.

American Institute of Architects, annual convention, Mark Hopkins Hotel and Masonic Temple, San Francisco, Calif., Apr. 18-22. Write: American Institute of Architects, 1735 New York Ave., N. W., Washington, D. C.

Third Biological Waste Treatment Conference, Manhattan College, New York, N. Y., Apr. 20-22. Write: Civil Engineering Dept., Manhattan College, New York 71, N. Y.



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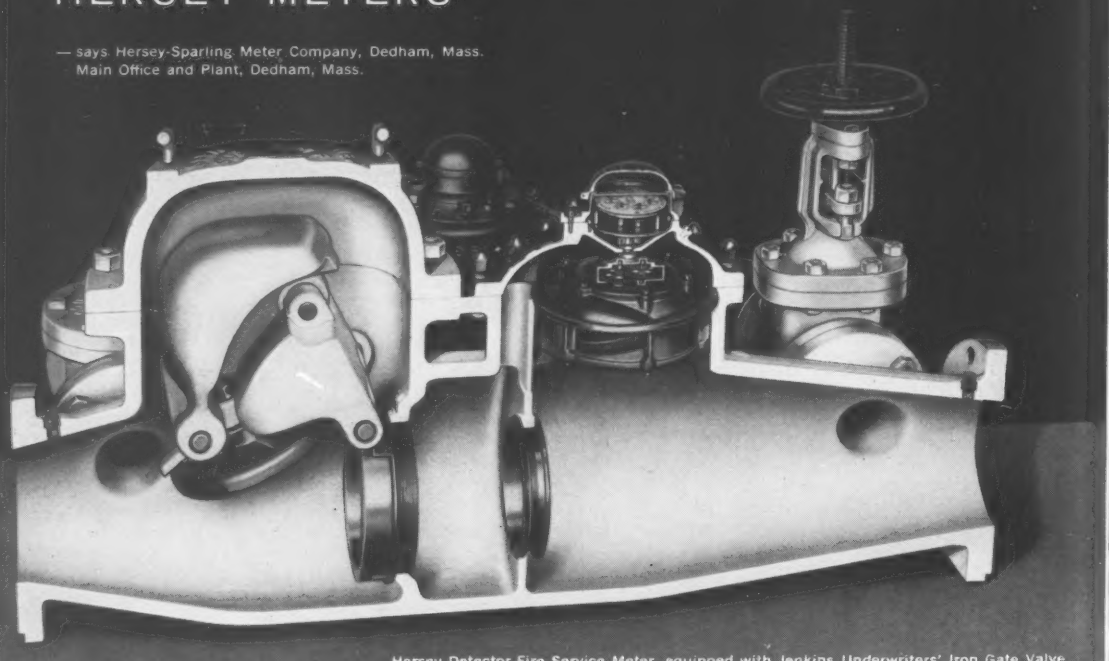

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Hersey-Sparling's customers, like the buyers of any equipment that incorporates valves, see the famous Jenkins DIAMOND trade-mark on the valves as a sure sign that nothing has been spared in assuring reliability and low maintenance costs. Architects, engineers, contractors and operating men are bound to respect equipment that carries the valves they so often specify to assure trouble-free piping systems.

Of course, valves of less quality can be had for a little less money. But it is worth remembering that Jenkins Valves, so widely known for reliability, cost no more than any *good* valves. Jenkins Bros., 100 Park Ave., New York 17.

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ENGINEERING NEWS-RECORD

Vol. 164, No. 13 March 31, 1960

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CONTENTS

Politics Flavors AGC Meeting 19
AGC Told Road Program Is Clean 20
Highway Probers Promise Some Scandals 20
Dickering Slows College Construction Aid 21
First Minuteman Installation Site Chosen 22
ICBM Base Construction at Canaveral 22
Coral Islands: Nike-Zeus Training Grounds 24
Two Tubes for Channel Tunnel Rail Traffic 25

FEATURES

Why No New High Buttress Dams in U. S.? 30
Prestressed Bridge Has Suspended Girders ..... 3[illegible]
Garage Specifications: Beauty and Economy 46

NEW PRODUCTS

Tractor-Shovel Has 1-Yd Bucket 53
Integrated Controls for Dragline 53

MEN AND JOBS

AGC's John Volpe: A Man With a Plan 57
ACI Elects Joe W. Kelly 58

BUSINESS AND FINANCE

Lumber Prices Are Moving Down 81

LABOR

Engineers Exempted From City Union 83
Union Sued for Strike Damages 83
Contractors Hit Situs Picketing 86

Reader Comment ... 6 Materials Prices 63
Calendar ..... 12 Construction Reports. 71
Washington Observer 17 Statistics, Indexes ... 74
Obituaries ..... 58 Editorials 100

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Back Issues of ENGINEERING NEWS-RECORD *are generally available for the previous six months. Semiannual indexes will be sent on request.* ENGINEERING NEWS-RECORD *is also indexed in Industrial Arts Index and Engineering Index.*

THE CONSTRUCTION WEEK

MALPASSET DESIGN WAS GOOD—Early suspicion of a rock fault in the failure of Malpasset Dam on the French Riviera was corroborated last week in the preliminary report of investigating engineers. A rock rupture caused the left abutment to shift and the 218-ft-high thin arch dam to collapse (ENR Dec. 10, 1959, p. 24). The Coyne & Bellier design and the construction got a clean bill of health.

DIG A DEEPER DITCH—Maj. Gen. William E. Potter, the retiring governor of the Panama Zone, will probably recommend deepening the canal to sea level. Estimated cost for such a project: $2.5 billion. "The canal has just about reached its capacity right now," he says. Now under way are $60 million worth of improvements—including lengthening and widening portions of the channel and a new Balboa Bridge near Panama City.

DEATH ON THE HIGHWAY?—The use of coal tar as a binder in highway paving can cause skin cancer in workers who apply it and lung cancer in drivers breathing road tar dust, warns the National Cancer Institute. Maur Travis, a Denver geologist, quoted the institute in challenging the use of a known cancer producer in highway paving. Colorado legislators have been backing use of the coal tar binder to revive the state's coal industry. The Colorado Department of Highways reported its experiments with coal tar paving mixtures have been "encouraging."

PEACE RIVER PLAN SCORES—Swedish industrialist Axel Wenner-Gren's $610-million scheme for development of the Peace River in British Columbia is entirely feasible from an engineering point of view, but more study is needed on several points before final government approval can be given. That's the essence of a six-page report issued by B. C. Water Comptroller A. F. Paget.

LOST KEY?—The Massachusetts Supreme Court cut the heart out of a planned $100-million government office in Boston last week. It ruled unconstitutional legislation authorizing a private group to build a $30-million office building for lease to the state. The decision also dims propects for a $33-million federal building at the site; its construction is contingent on the location of state and city buildings in the area.

NO HARM DONE—Between Nov. 8, 1959, and Mar. 8, 1960, the H. K. Ferguson Co., Cleveland engineer constructors, performed 1,565,445 man-hours of work without a single disabling accident. Thus the company was last week awarded the National Safety Council's "No Injury Award of Merit."

Project: Power Plant, Yankeetown, Ind.
Contractor: Traylor Brothers, Evansville, Ind.
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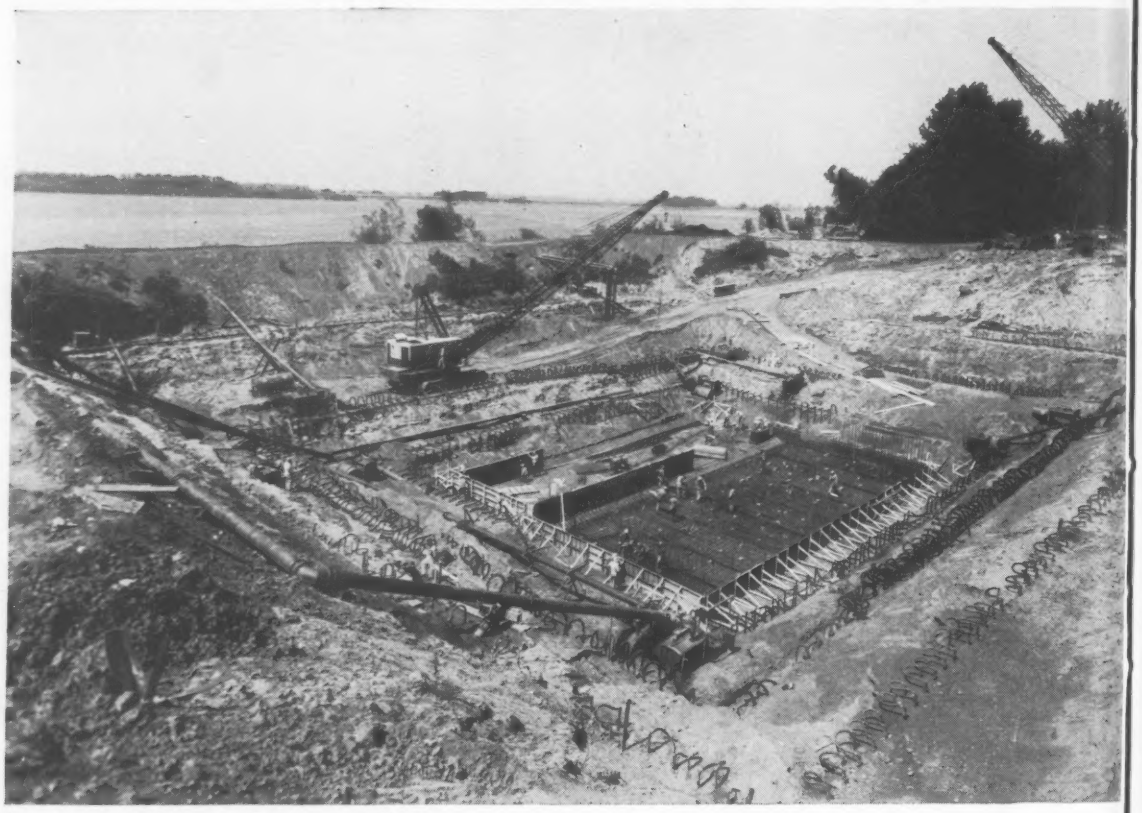

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25th YEAR

WASHINGTON OBSERVER

- **Goodbye Bomarc, hello Atlas and Minuteman**
- **Amistad means friendship?**
- **Tollroad in the works**

● **The Air Force is pushing a drastic cutback at Bomarc bases, while driving for a buildup of hardened ballistic missile bases.**

Four Bomarc bases would be eliminated—at Payne AFB, Wash.; Camp Adair, Ore.; Vandenberg AFB, Calif.; Travis AFB, Calif.

The Air Force wants to pump an additional $100 million into the Atlas ICBM program to add a dozen more missiles and launching sites.

The oncoming solid-fueled Minuteman with its flexible bases, on railroad cars or otherwise, would be beefed up by $25 million (see p. 22).

More money would be used to improve the Distant Early Warning (DEW) System, and the Pine Tree Warning System.

Atlas bases earmarked for money: Lincoln AFB, Neb.; Schilling AFB, Kans.; Offutt AFB, Neb.; Dyess AFB, Tex.; Plattsburgh AFB, N. Y.; Walker AFB, N. M.

Additional money would be used to step up construction of the Ballistic Missile Early Warning System (BMEWS) bases at Clear, Alaska, and in northern England.

● **Another private vs. public power fight is in store as Congress moves to authorize the Amistad Dam on the Rio Grande,** 12 miles upstream from Del Rio, Tex. A House foreign affairs subcommittee has completed hearings on the project, and approval is expected within a month on the construction provisions.

A private utility wants to develop the falling water, but Texas cooperatives want federal development. The issue is similar to the controversy over falling water at Trinity Dam in California, in which Pacific Gas & Electric Co. failed to win the right to develop the power. In Texas, the Central Power & Light Co. proposed to pay $337,000 yearly for the right to generate the electricity.

The $100-million dam would be built jointly with Mexico; power from the Mexican side of the dam would be developed by the government.

● **The huge demand for federal funds for top-priority highway mileage is bringing talk of tollroads in Delaware and Maryland for a project that is important, but not of top federal priority.** Under discussion is a 60-mile link from Baltimore's Harbor Tunnel to the Delaware River Memorial Bridge.

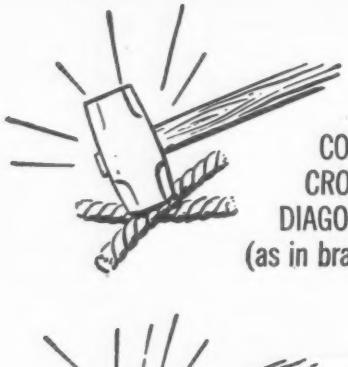
Both states want to build this mileage quickly to relieve congestion that now clogs the existing road, which is the only non-superhighway link in a chain that reaches from Washington to New York via the New Jersey Turnpike.

The two states will meet next month on plans for a joint project. If final engineering and traffic reports confirm present thinking, Maryland would push its $80-90-million section for completion by 1962.

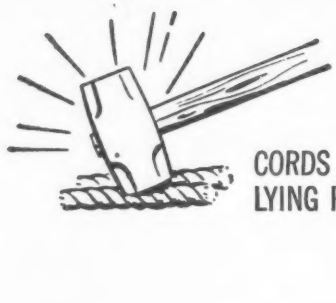
Officials say waiting for federal money would delay the construction by 8 or 10 years.

ROYAL CORD AIR HOSE

WHICH HOSE CONSTRUCTION CAN TAKE THE BEATING?



CORDS CROSSED DIAGONALLY? (as in braided hose)



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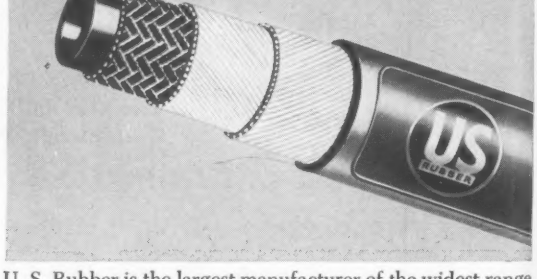

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Politics Flavors AGC Meeting

- **Contractors hear a free-wheeling political debate, a summons to greater participation in government and a defense of the U. S. budget.**
- **And they have one good hassle among themselves—over a proposal that would prevent bid shopping by general contractors among subs.**

The exotic flavor of election year politics spiced the meat and potatoes of business last week at the 41st annual convention of the Associated General Contractors of America in San Francisco.

As an appetizer, there was new-president John A. Volpe's keynote speech calling for increased political activity by contractors; as more hors d'oeuvres there came a partisan political debate between Paul Butler, Democratic National Chairman, and Republican Sen. Barry M. Goldwater (Ariz.); and for dessert, Budget Director Maurice H. Stans served up a vigorous defense of the Eisenhower spending policies.

But the main business course turned out to be a hot potato—an item aimed at preventing bid shopping by general contractors among mechanical specialty subcontractors. The convention cooled it off before swallowing.

As originally proposed, the plan would require a prime contractor to name a preferred mechanical specialty contractor for each major category; and it required mechanical specialty contractors to submit their intent to bid in writing to the prime contractor not less than 24 hours before bid opening, and a price figure not less than four hours before the opening.

The plan had been drawn up by a joint cooperative committee of AGC and the Council of Mechanical Specialty Contracting Industries.

The first action came from the AGC governing board, which tabled the proposal, arguing that it had insufficient time for thorough study. The governing board did praise the idea as one way of heading off possible federal and state legislation making listing of subcontractors mandatory.

The controversial plan popped up up again at a session of the building construction division when former AGC president C. P. Street moved that the procedures be approved in principle, but with the proviso that the executive committee would retain the authority to change wording when necessary and desirable. After more than an hour of heated debate, the motion was approved, 99-78.

But another resolution, passed at the final convention session, effectively stymied national operation of an anti-bid-shopping program, at least for now.

The convention voted not to recommend the bid-shopping plan to the American Institute of Architects, and suggested that local AGC chapters adopt such plans only when local specialty subcontractor groups agree to continue wholehearted support for the single contract system.

For the most part, however, the AGC's attention this year was more on the political arena than the job site.

"Our contracting industry—the biggest private enterprise in the U. S. today—could contribute much to the democratic system of which we are so proud if each of us became more active in the affairs of government." That's how Mr. Volpe set the tone for the meeting. And his call to politics isn't mere oratory—Mr. Volpe himself is Republican candidate for Governor of Massachusetts (see cover story, p. 57).

Mr. Volpe also set the stage for a close scrutiny of the federal highway program (see p. 20). He objected to "the unjustified condemnation of engineers, highway officials and contractors.

"Highways won't be built in hearing rooms and they won't be developed by demagoguery," he said.

From invited speakers not in construction the AGC members heard strong echoes of themes that will play heavily in the coming campaign.

Mr. Stans, after defending the controversial 1961 federal budget as adequate for national defense, insisted that the people of the U. S. want "fiscal responsibility" in government. He said the federal government is piling up future debts at an astonishing rate, and he ticked off these examples in the construction field: to complete the Interstate Highway System, $30 billion; for civil works projects already started, $7 billion after 1961; for projects authorized but not yet started, $13 billion; for future public housing $5.5 billion.

The debate between Mr. Butler and Senator Goldwater proved to be the political highlight of the meeting. It ranged far and wide over many matters of public policy, landing occasionally on these matters of construction interest:

Housing—Goldwater: Failure of the Democrat-controlled Congress to authorize increased interest on long-term government bonds has dried up the source of mortgage money. **Butler:** Demand for housing has dried up because interest rates have gone up under the Eisenhower Administration.

Schools—Goldwater: American communities can support their schools without the throttling effects of federal controls. Only 237 of 42,000 school districts in the country are bonded up to their legal limitations. **Butler:** Federal aid to education is justified for two reasons—the U. S. is short 200,000 classrooms; Russia is training three times as many engineers as we are.

Highways—Goldwater: The Eisenhower Administration has given dynamic leadership to the highway program, but states are reluctant to let the government increase gas taxes. **Butler:** The Administration has been pushing highway financing problems under the rug.

Growth—Goldwater: Unearned wage increases won by labor are the main reason the U. S. economy has not been expanding as rapidly as it should. **Butler:** Eisenhower fiscal policies have artificially restricted purchasing power, thus holding back economic growth.

As for direct political action, Lester C. Roger, chairman of the legislation committee, urged AGC members to support the Boggs bill (H.R. 7123), which would protect the right of trade associations to express views on legislative matter, and oppose the Kennedy bill (S.B. 2643) and the Forand bill (H.R. 4700). The Kennedy bill would legalize secondary boycotts and the Forand bill would establish free hospital and medical care for individuals eligible for social security.

AGC Told Road Program Is Clear

A panel discussion devoted to refuting recent criticisms of the federal highway program was one of the main events at the AGC convention (see p. 19).

Congressional hearings on the highway program were denounced for their origins, personnel and honesty by the panel's star member, Rep. Gordon H. Scherer (R., Ohio), ranking minority member of the House of Representatives Subcommittee on Roads.

"The present congressional hearings on the highway program are politically inspired," said Rep. Scherer. He told the audience that some members of the committee were selected because of their reputations as hatchet men and that most of the charges of graft and corruption in the highway program were totally irresponsible.

Congress was entirely to blame for the recent shortage of money in the Highway Trust Fund, said the Ohio Congressman.

The House and Senate got the recession jitters in 1958 and accelerated the highway program by $1.5 billion, but omitted to provide additional money for the Trust Fund to take care of the acceleration, he said.

When it began to dawn on the "sidewalk engineers in Congress" that the fund was depleted and the road program was grinding to a halt, some Congressmen had to find a whipping boy and they put the blame on the Bureau of Public Roads and the state highway departments, according to Representative Scherer.

Accomplishments of the highway program were pointed out by another panel member, Bertram D. Tallamy, Federal Highway Administrator, who said that in the 3½ years since the federal highway program was started, 100,000 miles of highway have been built, including 94,070 of ABC highways. Cost of the program thus far: $13.5 billion.

"I believe that this panel has definitely repudiated any sensational charges made against the program," was the happy summation of the discussion made by panel moderator John A. Volpe.

(Mr. Volpe's victory announcement was probably a bit premature. The charges made so far were just the opening campaign in what might be a long war. See below.)

Mr. Volpe said that by the time four years of work under the act are completed, in late June, the contracting industry will have put into place almost as much highway construction as was done in the 40 years prior to 1956.

The capacity of the construction industry and the highway departments to handle the increased program was praised by A. E. Johnson, executive secretary of the American Association of State Highway Officials. AASHO had just completed a study of this subject.

As reported by the various states, the total capacity of highway contractors in the U. S. is a little over $18 billion. At the high point of the year, the federal highway program uses about 25% of that capacity, Mr. Johnson said. And he estimated that the various states have a favorable market for their projects when using a little less than half of the contracting capacity.

State highway departments say they could step up the program far in excess of this year's effort, Mr. Johnson reported. He concluded that both the contracting industry and the highway departments have geared up to handle the program.

. . . But Investigators Promise Some

A full-scale McClellan-type investigation into alleged highway scandals is developing in Washington and other cities around the country this week.

Controversy over the investigation erupted in San Francisco when Rep. Gordon Scherer (R., Ohio) told the AGC convention that the probings were only a political maneuver (see story above).

Rep. James Wright (D., Tex.), who has been hinting for weeks about sensational disclosures soon to be made, fired right back that the investigation is proceeding without political bias "in both Republican and Democratic states."

The controversy revolves around the activities of a staff of investigators assembled by Rep. John Blatnik (D., Minn.), chairman of a special subcommittee of the House Public Works Committee. They are investigating the administration of the multibillion-dollar highway program.

Representative Blatnik, who has a reputation for making political hay and getting legislative results from his committee, has had a team of investigators at work in Tulsa, Okla., for the past couple of weeks. They are asking about a stretch of 9 or 10 miles of Interstate highway on a by-pass route near Tulsa that is reportedly showing wear only a year or so after its completion. Last week the Bureau of Public Roads sent in a team to make new construction tests on the highway.

The Tulsa investigation is a sample of what's in store for the BPR, state officials and local contractors.

There won't be any full-scale hearings on scandals in the highway program this year. The subcommittee knows it can't whip up enough interest in this session of Congress.

But the highway committee plans to produce enough questionable cases in the months ahead to convince Congress that there is a need for a watchdog committee to "give the thing a real going over in 1961."

Since the committee was officially created last autumn, it has received hundreds of letters alleging poor administration and even outright graft and corruption.

Although a high percentage of such reports came from cranks, there are 50 to 60 cases in the committee's files right now that staffers say will produce some "questionable" practices.

The committee also has on tap two or three incidents that indicate highway projects are not being built to approved specifications. Additionally, it has had a team investigating New Jersey's use of consulting engineers. Quick looks have been taken at road construction programs in other states too.

The committee will run its investigation the same way the McClellan committee on labor racketeering did. A flying team of investigators will move into an area where malpractices are suspected. Then they will try to wrap up the evidence in a tight legal bundle before any fanfare is made of the issue. The next step will be to call congressional hearings, where persons involved will have the evidence laid out before them. This procedure was highly effective in the labor investigations, and the highway committee thinks it will be just as productive for them.

The Blatnik subcommittee picked up most of the high-powered staff of the McClellan committee when it dissolved. Staffers are mainly former FBI agents and assistant district attorneys. A civil engineer will be hired soon.

Chief counsel for the subcommittee is Walter May, former FBI man and a veteran of the McClellan committee. Carmine Bellino, the committee's "books and records man," is known to Congressmen as one of the sharpest investigators in the field.

An FBI agent from 1934 to 1945

ars a Hound's Tooth . . .

"This panel has repudiated any sensational charges."—John A. Volpe.

Panel members defended the increase in the cost of the program as compared with the original 1956 estimate and the effect this had on the depletion of the Trust Fund.

By the time the 1958 re-estimate was made, the Senate had added 1,000 miles to the system without providing for additional revenues, charged Representative Scherer.

Mr. Johnson stood behind the 1958 estimate and predicted that the 1961 estimate, called for in the original act, will not reflect any appreciable increase in cost.

The 1958 estimate took 1.2 million man-hours to prepare, he said, and in his opinion it was the best estimate on public works that has even been undertaken.

Mr. Volpe argued that construction bid figures hadn't gone up.

The panel also included California State Senator Randolph Collier, who has been responsible for much important highway legislation in that state.

me TV-Size Scandals

REP. JAMES WRIGHT—No bias here.

CARMINE BELLINO—He studies records.

and administrative assistant to J. Edgar Hoover for 5½ years, Mr. Bellino is credited with uncovering tricky financial dealings of labor bosses for Senator McClellan.

Mr. Bellino isn't part of the Blatnik staff, but is retained as a consultant. He's been working almost full time with the committee for several months and he's expected to continue with them.

Also enrolled from the McClellan committee are John P. Constandy, a former New York assistant district attorney; George H. Martin, who was a newspaperman before starting his 10 years of congressional committee work, and former New York City detective Sherman Willse.

The highway subcommittee will hire four or five more staffers, detectives and lawyers.

Congress voted $295,000 to keep the subcommittee going for the rest of 1960. The committee expects to get new money pumped into it for several years to come, if all goes as planned.

The committee will concentrate on building its case during 1960. Then, it will break loose with real fireworks in 1961.

A Matter of Degrees

College aid slowed by fight over how and how much

The Republican Administration and the Democratic Congress agree that the federal government should expand its interest in college construction this year from eating and sleeping to learning. But they're far apart on how to do it.

Health-Education-Welfare Secretary Arthur S. Flemming last week forecast a "major crisis" in college housing and classrooms by 1964. By then, he told a House education subcommittee, colleges will have had to expand enough to absorb another million students; they will have to spend $9 billion to do it.

"We cannot afford to wait until the next session," Mr. Flemming said.

But this session—short to begin with because of the nominating conventions in early July—has been tied up with the civil rights issue. It is doubtful that the Administration and Congress will be able to agree on a college construction bill in the three months between now and convention time.

At present the Housing and Home Finance Administration administers a revolving fund of $1,175,000, which it lends to colleges at 3⅛% for construction of dormitories, cafeterias and student unions.

The Democrats feel the present program is working well. They would meet the impending crisis by expanding its coverage to include classrooms and libraries.

Last week Rep. Carl Elliott (D., Ala.) introduced a bill that would extend the loans to cover classroom and library construction; beef up the kitty by $200 million a year for each of the next four years—for a total revolving fund of almost $2 billion; and transfer the job from HHFA to the U.S. Office of Education.

The Administration's approach is a loan-guarantee program.

Basically, the plan provides:

- Federal guarantees on bonds sold by private colleges for any academic or housing facilities, up to a total of $1 billion outstanding in loans at any one time over the next five years. It is limited to private colleges because state schools can float tax-exempt bonds without difficulty.
- Federal grants to pay 25% of the principal over a 20-year period on either taxable or tax exempt bonds. Total grants would be limited to $500 million —which would mean construction of about $2 billion worth of buildings.

The Administration says its program would mean lower annual payments by the colleges. But the Democrats doubt that colleges could borrow enough money at reasonable interest rates.

Minuteman Coming

First site is chosen, next comes bid invitation

The first Minuteman ICBM installation, worth about $60-million of construction, will be built near Great Falls, Minn. Malmstrom Air Force Base there will serve as headquarters for three missile squadrons.

Invitations to bid on construction contracts will be issued later in the year. Award of the first contract is planned for January, 1961.

Construction cost of the Minuteman base runs about $20-million for each of three squadrons of 12 or so underground launching silos.

The minuteman ICBM, still in the development stage, will be a three-stage, solid-propellant missile that will be blasted out of underground silos the way a shell is fired from a cannon.

The Great Falls installation will be the first of what will probably be dozens of Minuteman launching facilities. In addition to fixed installations, the Minuteman ICBM will also be deployed on railroad cars moving about the country at all times.

Each Minuteman launch position will require about two acres of land, plus easements for entry and communications and power lines.

This will allow some 3 to 5-ft clearance between the liner wall and the missile. The silos will consist of little more than a firing tube in which a stand about 6 ft high will be built with the misslie sitting in a vertical position on it. Since the missile is solid-fueled, it will not need last-minute servicing. In theory, the missile will be fired by remote control as it rests in the silo.

Military engineers have been running tests to figure out the cheapest way to build silo liners. Both steel and concrete liners have been used.

Firing of the Minuteman's first stage in the silo will result in extremely high temperatures. But this will last only about one second before the missile clears the silo. So no vents are needed.

Because the Minuteman will require none of the elaborate liquid-propellant fueling facilities, radar apparatus, and similar ground support equipment that go with the Atlas and Titan ICBM installations, the Minuteman bases will cost roughly half the price of facilities for a squadron of the latter two missiles.

Minuteman bases will have greater underground protection than Atlas and Titan launching sites.

1. Silo is cast in 19-ft lifts and sinks under own weight.

3. Crane removes spoil from center of silo as it goes down.

. . . Building Minuteman Ba

The future of the U. S. missile defense program depends to a great extent on two huge, reinforced concrete cylinders sunk with expensive precision into the sugar sand of Cape Canaveral, Fla.

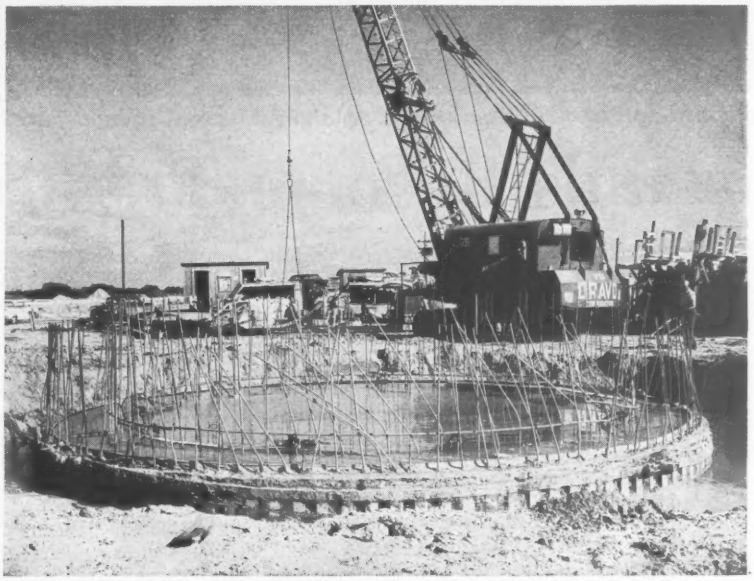
These underground silos, 109 ft deep and 34 ft in diameter, will be used late this year for test firings of the Minuteman, the solid-fuel ICBM that Pentagon planners hope will fill the missile gap.

The two ICBMs developed so far, the Atlas and the Titan, are housed in underground silos for protection, but they are raised to the surface for firing. The Minuteman will be fired directly from the concrete silo that shelters it.

The two testing silos at Patrick Air Force Base, Cape Canaveral, must be strong enough to withstand the tremendous blast of the rocket as it is fired.

Each of two concrete tubes is rein-

2. Compresed air is jetted under the silo to speed sinking.



4. Once in place, silo gets a tremie seal and is pumped dry.

Bases at Canaveral

forced with 100 tons of steel and weighs 4,000 tons. They have walls 4 ft thick and an inner diameter of 26 ft. Each of the 109-ft silos will be sealed at the bottom with a 12-ft layer of tremied concrete. A 7-ft concrete structural floor will go on top of this.

Dravo Corp., Pittsburgh, is constructing the two silos under a subcontract with George A. Fuller Co., New York City, builder of the entire testing complex.

The Minuteman testing complex is close to the Atlantic Ocean, like everything at Patrick AFB. Water at the site was found at 3 to 5 ft, but it was no problem for Dravo on the silos.

Fuller decided it would be more economical to sink the two sleeves as caissons rather than to build them after excavation and dewatering. The initial pour for each silo, 14-ft deep, went on top of a steel cutting shoe and settled into the sand with its own weight. Subsequent lifts of 19 ft each carried the tubes down with the aid of jetted air. As the tubes went down, a crane mucked out their centers.

The builders jetted air outside the silos below the cutting shoes. Air was used because it broke down the soil structure quicker than water. The jetting eased pressure on the cutting edges and permitted the silos to sink faster. The concrete walls were sprayed with a membrane to hurry the sinking.

Precise tolerances called for in the specifications made the job expensive and difficult. The two 109-ft silos weren't allowed to be more than 4 in. out of plumb. Their walls have a tolerance of ±0.5 in. During sinking, one silo went 2.5 in. out of plumb, but Dravo got it back to 0.25 in.

This precision is demanded because the Minuteman's guidance system must know at launching its exact position on the earth. The center point of the base of a silo will serve as a bench mark.

Test firings of the Minuteman have been advanced from early 1961 to late this year. The missile is expected to be combat ready sometime between July 1962 and June 1963.

The Minuteman is seen as the answer to the needs of the U. S. defense program; it is cheaper, smaller and simpler than the Atlas and Titan ICBMs.

Its principal advantage is that it will use solid fuel, which can be loaded into it far in advance of firing. It won't need the elaborate pre-launching preparations demanded by the Atlas and Titan, which are powered by a highly refined kerosene that is oxydized by liquid oxygen.

The Minuteman's 55-ft length makes it considerably smaller than the 82.5-ft Atlas and the 90-ft Titan. But it has approximately the same speed, 17,000 mph, and range, 6300 miles, as the two larger rockets. Its nuclear payload will be much smaller than that carried by the Atlas of Titan, but the U. S. will be able to manufacture many more of them.

The Pentagon now hopes to have 50 to 100 Minuteman missiles ready by the end of 1963. They will cost about $600,000 each.

A total of 800 of them are planned and 550 of these will be installed in underground silos throughout the country. The rest will go on mobile railroad cars, trucks or barges.

Contract lettings for these operational bases will begin early next year (ENR Feb. 18, p. 27).

Fuller has a $6.1-million contract for work on the Minuteman test complex that includes the two silos, two pads, two blockhouses and eight other buildings. Completion date for the job is April 14. Fuller started it in July, 1959.

Nike-Zeus launching and support installations will dominate Kwajalein's 1-sq-mi area.

Coral Islands Become Trainin

The world's longest, most elaborate, most expensive trapshooting range is under construction on three minute islands in the Central Pacific.

On this range the "clay pigeons" will weigh 55 tons and arch through the sky at 7,000 mph. They'll cost more than $1 million each, but our national security depends on how frequently they're destroyed.

The three islands, Kwajalein, Roi-Namur and Johnston, will be testing and developing bases for the only U. S. anti-missile missile, the Army's Nike-Zeus. Completion is scheduled for 1962 (ENR Mar. 24, p. 59).

Jupiter intermediate range ballistic missiles, playing the part of enemy missiles, will be fired from Johnston Island toward Kwajalein, 1,400 miles away. When radar on Kwajalein and Roi-Namur, a part of Kwajalein Atoll, detects an "enemy" missile, complex machinery will automatically fire a Nike-Zeus and guide it to intercept and destroy the invading Jupiter.

Construction on Kwajalein Island will include four Nike-Zeus launchers shielded by a huge earthwork at the western end of the island. Except for a standard building that will house technical operations, most of the construction on Kwajalein will be unusual, particularly a radar receiver and transmitting building and a target track radar building. Both these structures must be located in precise relationship to each other.

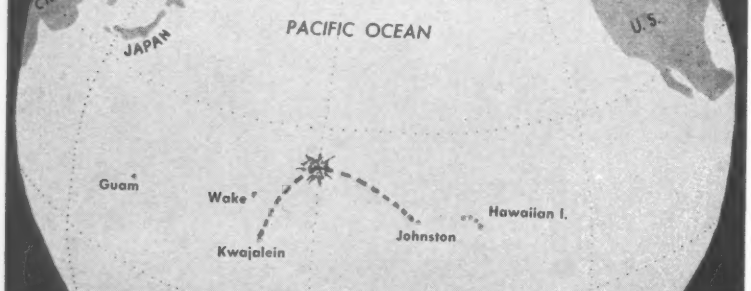
The radar unit on Kwajalein will emit a radio frequency field so intense that it could be fatal to humans. Operating personnel will have to enter the building by a tunnel. A fence, 48 to 61 ft high, built at a 330-ft radius around the building, will shield the radar at ground level. The fence will destroy the radio frequency field to its height.

Two power plants, one of seven 1,500-kw units for the radar and one of six 800-kw units for the Nike-Zeus batteries, will go up on the island.

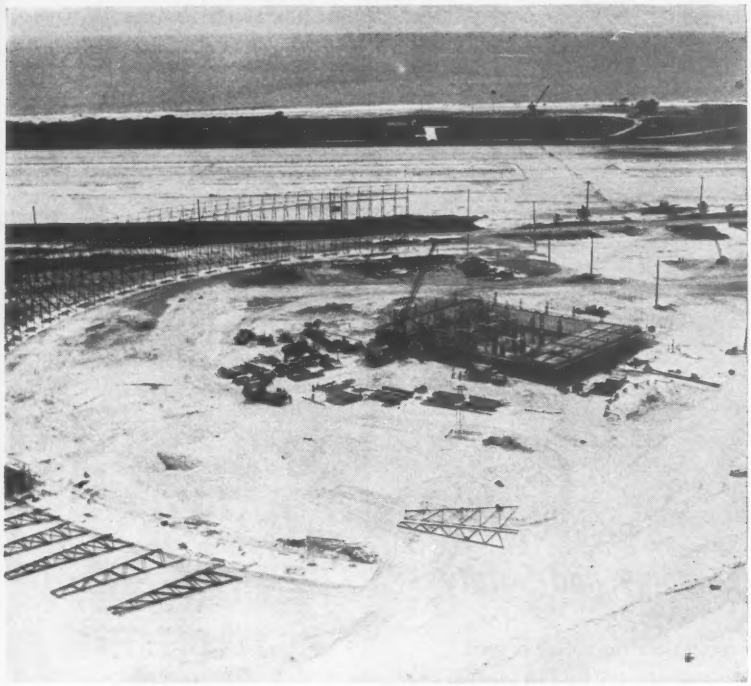
Some 325 workers are engaged on $13 million worth of construction. Soon there will be 3,000 men and $25 million in contracts.

The Army Corps of Engineers will let $10 million worth of contracts for launching and tracking facilities on Kwajalein by June 30.

The island's buildings are located on



The Central Pacific—where missile will shoot down missile.



Radar needs fence to break down lethal radio frequency field.

Grounds for Nike-Zeus

a silt layer 1 to 4 ft thick that is 10 to 15 ft below finish grade. Sites for the structures are surcharged to compress any void. Coral material of about the same weight as a proposed building is piled on the site and allowed to settle. Daily instrument checks are made and the amount of settle is plotted on a graph until the curve levels off. When the surcharge is removed, a slight, but measurable, rebound occurs.

Kwajalein's high humidity and the resulting corrosion problem make it necessary to give much attention to structural steel. A 4-in. cover on all reinforcing steel is required where concrete is exposed to the elements. All but stainless steel will corrode within a month if it isn't coated.

The contractor gets aggregate by dynamiting a coral reef on the east side of the island. The dynamite is placed at low tide and detonated at high tide. It costs about $4.50 a yard to get the aggregate to the crusher. Cement is imported from Japan. Sand is produced from crushed coral.

Kwajalein construction work also includes expansion of the island's unusual rainwater catchment system. A 53-acre depressed area between the airstrip's runway and taxiway impounds 1.2 million gallons for each inch of rain and has a total capacity of 5 million gallons.

The Ralph M. Parsons Co., Los Angeles architect-engineer, handles construction of the Nike-Zeus technical structures on Kwajalein. Work is done by a joint venture made up of Pacific Construction Co., Honolulu; Reed & Martin Inc., Fairbanks, Alaska, and H. B. Zachry Co., San Antonio, Texas.

Work hasn't started on Roi-Namur Island, 45 miles north of Kwajalein, but almost $30 million worth of construction is scheduled. Although it is only an auxiliary to Kwajalein, the need to build housing pushed up construction costs. Roi-Namur will have radar tracking and control facilities that will supplement those on Kwajalein.

On Johnston Island, 1,400 miles to the northeast and 700 miles from Honolulu, Reed & Martin and Wayne Construction Co. are dredging for fill to add 23 more acres to the island's one-half-sq-mi area.

When the fill project is completed in May, work will begin on rehabilitation of existing structures and on construction of three launching pads for Jupiter IRBMs.

Contracts with a total value of $20 million will be let in the next few months for construction of the Jupiter launching installations.

Channel Tunnel

Report proposes two tubes for rail traffic only

Construction of a $300-million railway tunnel under the English Channel between Great Britain and France was recommended to Prime Minister Harold Macmillan and President Charles de Gaulle this week in the final report of the Channel Tunnel Study Group.

The group is an English-French-American organization that has been promoting the 158-year-old tunnel project since 1957. It hopes to start construction next year and complete it by 1967.

Details of the final report can be revealed only by the governments of France and Great Britain, but it is known that it proposes two tubes handling electrically powered trains in each direction.

The report says the tunnel may be either bored through the chalk bed under the channel or constructed as a trench tunnel. The group will leave it to the governments to decide which method to use. Both will cost about the same amount.

A highway tunnel under the channel was not proposed because the exhaust fumes from automobiles and trucks would present an expensive ventilating problem. Instead, trucks will be carried on flatcars and automobiles on double-deck flatcars. The trains will have capacities of 1,800 autos per hour and will make the tunnel run in 45 minutes. The tunnel would run between Folkestone (near Dover) and Calais.

The only obstacles remaining are the financing and approval of the British and French governments.

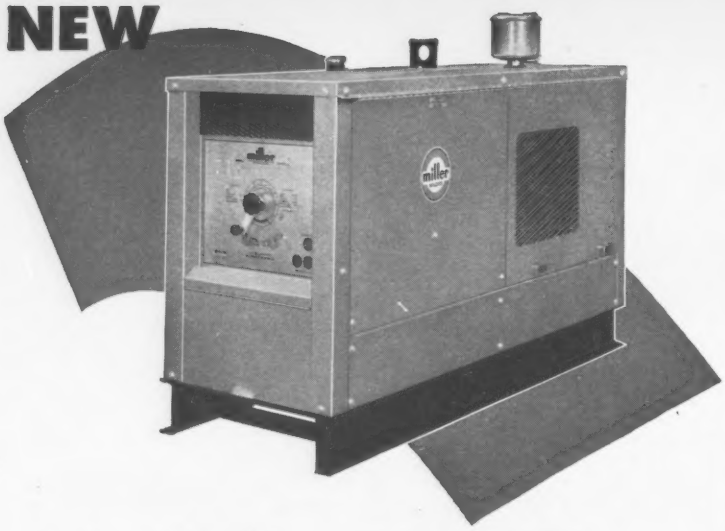
Endorsement from London and Paris is expected to be only a matter of time. Financing will be the big problem, because it will have to be done privately.

Technical Studies, Inc., a New York City firm with a 25% interest in Channel Tunnel Studies Group, has been rounding up prominent investment houses in New York, Paris and London to handle the underwriting of a bond issue.

Technical Studies organized the Channel Tunnel Study Group in 1957. Members include French and British companies, formed in 1875 to dig the tunnel and still in existence, and the Suez Canal Co., which had just lost its real estate to President Nasser. The four companies share equally in the venture.

The group has so far put some $710,000 into technical and economic studies. Technical Studies, Inc., engaged Mor-

NEW



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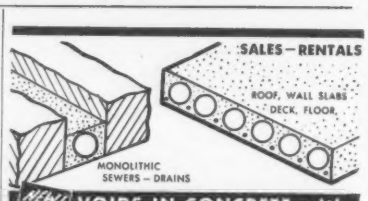

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rison-Knudsen Co., Boise, Idaho; Bechtel Corp., San Francisco, and Brown & Root, Inc., Houston, to study the possibility of boring a tunnel.

Another consortium, made up of Raymond International, New York; Kaiser Engineering & Constructors Inc. of Oakland, Calif.; De Long Corp., New York City; and Healy Tibbits Construction Co., San Francisco, worked on the possibility of lowering precast reinforced concrete tube sections into a trench in the channel bed.

De Leuw Cather & Co., Chicago, is making a joint traffic and revenue study of the project with the Economist Intelligence Unit, London, and the Societe d'Etudes Techniques et Economiques, Paris.

Although the channel tube won't be the world's longest tunnel, it will be the longest vehicular tunnel, from 20 to 22 miles underwater and about six miles at each end for approaches.

Death Goes Underground; Tunneling Takes Its Toll

Tunnel accidents struck in three countries in a five-day period ending last week and killed 30 construction workers. The mishaps occurred in Indianapolis, Toronto and Shingu, Japan.

Leaking gas from a ruptured main exploded in a sewer tunnel under construction in Indianapolis last week, killing three workmen and injuring four. The tunnelers were working about 20 ft below grade when timbers supporting a gas main 12 ft above the tunnel collapsed.

A broken light bulb is believed to have sparked the escaping fumes causing the blast, which in turn triggered additional cave-ins. Rescuers dug through an avalanche of mud, sand and gravel to reach the six men.

Coincidentally, on the same day as the Indianapolis tragedy, 22 lives were snuffed out in an explosion in an aqueduct tunnel being built in Shingu, Japan.

Less than a week before the Indianapolis blast, five workmen were killed in a tunnel fire under the West Branch of the Don River in Toronto. Working under air in the six-ft-high tunnel, the men were welding 36-in. steel water pipe that was being installed within the bore. The compressed air supply was knocked out when air hoses were destroyed by a fire apparently started by welding sparks. Attempts to supply air from another entrance failed because mud had plugged a small air hole in a bulkhead.

The provincial government is investigating the possibility of safety violations in the face of claims by civil defense officials that the men could have been saved had remote breathing apparatus been available earlier.

How **protection in depth** helps cut compensation costs

Minutes make a difference when a worker is badly hurt

Quick help for your accident victims can save more than a life or a limb. It can also save you compensation premiums. Working out of 106 offices coast to coast, Liberty claimsmen act fast to see that your worker receives proper care. If necessary, consulting medical specialists are rushed to his hospital bed. A rehabilitation nurse begins her liaison with patient, doctor and policyholder to speed recovery. Detailed claims investigations are made while the facts are fresh. This thorough, emergency action is but one of the many Liberty Mutual services that add up to protection in depth. To learn more about Liberty's protection in depth and how it can help lower your business insurance costs, just get in touch with the Liberty Mutual office nearest you.

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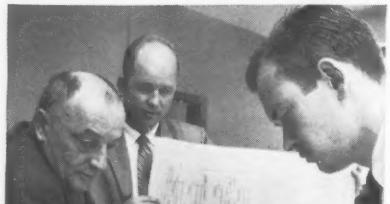
Keep our roads on the GO

Steel construction offers adequate clearance and reduces height of approaches.

Mr. Harold S. Woodward, partner, Seelye, Stevenson, Value and Knecht, agrees that nothing is easier to design with than steel.



Mr. Williams D. Bailey, partner of the firm (left) supervises steel designs with his assistant, Mr. R. F. Shumaker (center), and Mr. Melvin Leonard.

Short-span steel bridge over the Connecticut Turnpike. Simple design saves engineering time and erection costs.

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Steel specified in over 95% of short-span bridge designs

at Seelye, Stevenson, Value & Knecht, Consulting Engineers, New York, N.Y.

The Bridge and Highway Division of this engineering firm deals almost exclusively in the design of short-span bridges from 100 to 125 feet long. In the past few years, the firm has designed bridges for the New York Thruway, the Connecticut Turnpike, and large projects in Ohio and Virginia. More than 95% of these bridge plans specify steel construction, according to Mr. Harold S. Woodward, partner in the firm.

Reasons for favoring steel construction. There is nothing easier to design with than steel . . . it takes only a fraction of the time for the designers to draw their plans, because considerably fewer mathematical calculations are required. If changes have to be made, it is relatively simple with steel design. With some other forms of construction, any changes may mean redesigning the entire structure—a costly waste of professional manpower.

Steel is available. This factor deserves serious consideration on any job. Steel is readily available and can be transported quickly and simply to the job.

Steel goes up quickly. Bridge spans must be constructed with least interference to traffic. The speed with which steel can be erected without normal traffic interruption is a big advantage.

Steel permits maximum headroom—also, minimum approach alteration. According to Mr. Williams Bailey, another partner in the firm, the use of slender steel beams keeps overpass approaches at a minimum in congested areas, and makes it possible to allow for tight clearances with minimum disturbance to established roads and buildings.

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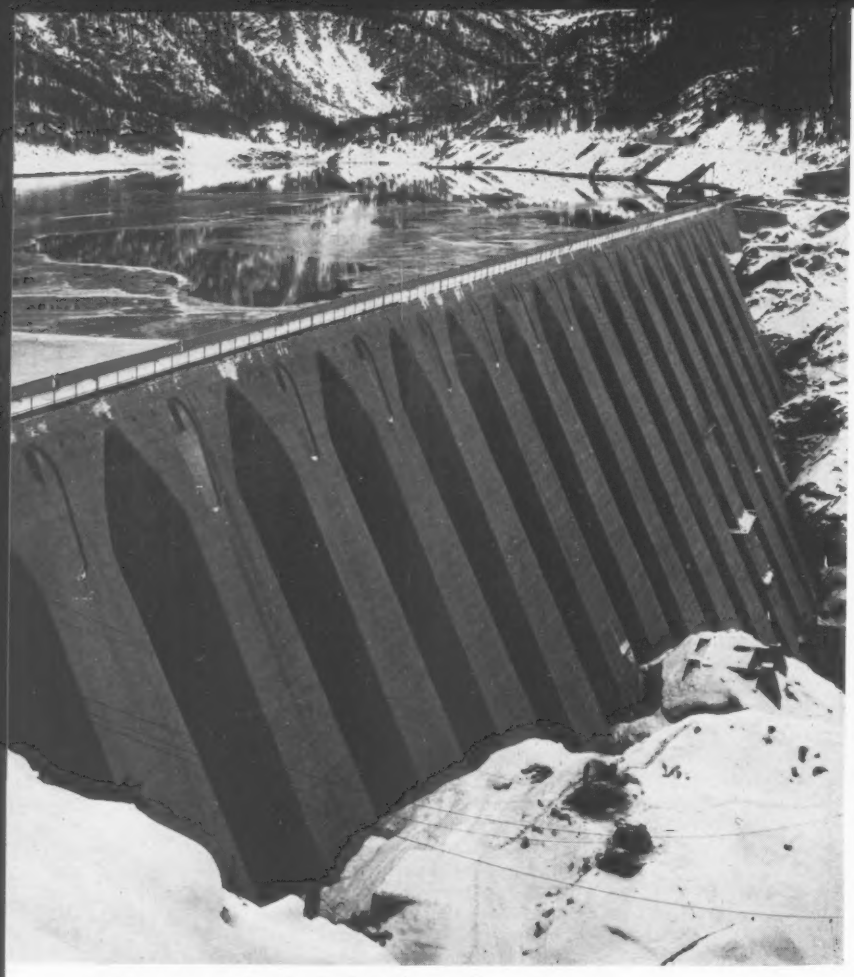
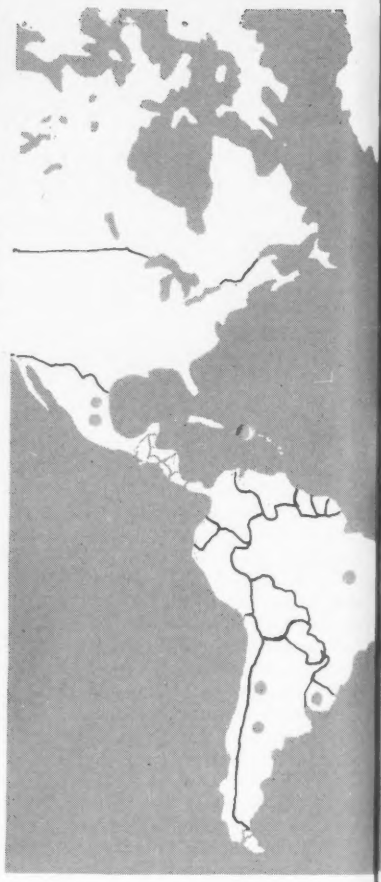


Gioveretto Dam in Italy is one of . . .



. . . Thirty massive-head buttr ms and

Why Don't U. S. Dambuilder Buil

By G. S. Sarkaria

Why is it no high buttress type dams of any consequence have been built in the U. S. since the early Forties?

They have been used rather extensively abroad. The fact that more were built in the Fifties than in any previous decade would indicate that their popularity is increasing.

Still, designers of U. S. dams seem loathe to use the massive buttress or the hollow gravity designs that save so much concrete for designers elsewhere.

Are U.S. dambuilders overly cautious, unduly suspicious of these structures? Need they be?

Mr. Sarkaria has been designing dams and other hydraulic structures for a dozen years. He has worked on such big ones as Bhakra and Kosi dams in India, the Furnas project in Brazil and Shihmen Dam in Formosa. He is now supervisory engineer with International Engineering Co., Inc., San Francisco.

Buttress dams are but modifications of the solid gravity type. Each buttress is essentially a gravity-type cantilever that supports a water-bearing deck in the form of a slab, an arch, or a massive head flareout from the buttress itself.

The buttress is in effect a thinned-down block of a gravity dam, made longer at its base to be kept stable against overturning. It offers a substantial saving in concrete over the conventional gravity type, and it reduces the temperature-control problems connected with placement and setting of mass concrete blocks.

There are admittedly several deterrents to the widespread use of buttress designs. But are they so insurmountable? Consider these few:

- The buttresses and their heads—or the slabs or arches they support—take more time and effort (therefore, money) to form than do solid blocks of mass concrete.
- High strength concrete with small aggregate, and—for some types of designs—large amounts of reinforcing steel, may be needed.
- Seepage through joints between buttress heads may be tough to prevent.
- Dams with thin components are more susceptible to damage from freezing and thawing.
- Earthquakes are more a threat to relatively thin buttresses than to gravity dams, and the buttresses might be relatively easy to demolish in time of war.

All these deterrents to use of buttress dams can be obviated by suitable design and improved, modern construction methods. Most types of massive-head buttress dams can be made completely acceptable.

• Buttress types—The round-head buttress dam, most prominent of the massive buttress types, was first proposed by the late F. A. Noetzli in 1925. Don Martin Dam on Rio Salado, Mexico, completed in 1929, was the first dam of

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MASSIVE-HEAD BUTTRESS DAMS

Dam	Location	Year Built	Height-ft	Length-ft	Volume-cu yd
Ben Metit	Tunisia	1954	196	1480	460,000
Bekhme	Iraq	Planned	613	2700	
Cleuson	Switzerland	1950	285	1375	524,000
Cruz del Eje	Argentina	1944	128	2680	223,000
Don Martin	Mexico	1929	105		
Elmali	Turkey	1956	135		
Errochty	Scotland	1952	130	1260	205,000
Escaba	Argentina	1949	272	764	325,000
Fedaia	Italy	1954	212	2040	226,000
Gioveretto	Italy	1956	266	1240	366,000
Glen Shira	Scotland	1956	133	2250	260,000
Las Virgenes	Mexico	1946	187	560	
Lucendro	Switzerland	1947	236	885	205,000
Peligre	Haiti	1957	233	860	320,000
Pracana	Portugal	1951	213	840	170,300
Rincon del Bonete	Uruguay	1943	140	3846	392,000
Scais	Italy	1939	212		260,000
Sebakwe	Rhodesia	1955	127	800	60,000
S. Giacomo di Fraele	Italy	1951	295		785,000

HOLLOW GRAVITY DAMS

Ancipa	Sicily	1952	365	830	412,000
Bau Muggeris	Sardinia	1950	190	765	172,000
Dixence	Switzerland	1935	285	1500	552,000
Juquia	Brazil	Underway	169		78,000
Malga Bissina	Italy	1958	279	1940	560,000
Malga Boazzo	Italy	1957	187	1450	
Pantano d'Avio	Italy	1955	210	1312	249,000
Pidima	Greece	1954	180	335	43,000
Poglia	Italy	1950	161	450	45,000
Sabbione	Italy	1954	200	915	177,000
Trona	Italy	1942	196	595	109,000

buttr ms and hollow gravity dams built or started in the Western world, most since the early '40s.

erBuild Buttress Type Dams?

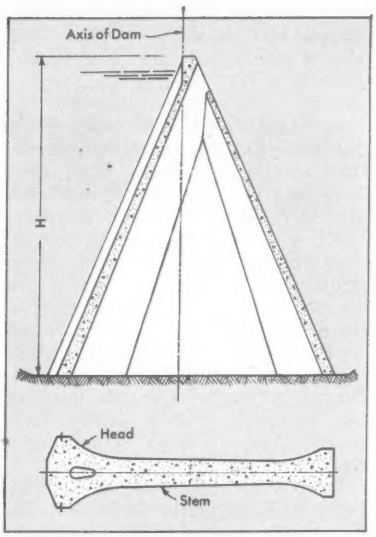
this type built anywhere in the world (see photo p 33).

Many other varieties of massive-head buttress dams have been proposed and built since that time in different parts of the world.

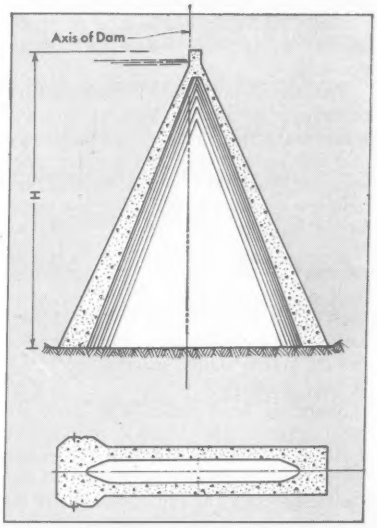
The hollow gravity or cellular buttress type is currently popular in Italy. It is a refinement of a design originally proposed at the beginning of the century. The present version has been developed and standardized by Italy's Claudio Marcello and is often referred to as the Marcello-type dam. In this type the buttress is hollow as compared to the single-wall stem for the other variations of the massive-head buttress dam.

• **Comparing the types**—A typical massive-head buttress is compared with a hollow gravity dam block in the drawing at the right.

Both the massive-head solid buttress and the hollow gravity types of dams require about the same amount of con-



MASSIVE-HEAD buttress is simple.



HOLLOW GRAVITY saves on concrete.

crete. The former is much simpler in construction and requires almost half the amount of formwork. The hollow or cellular buttress type of dam has greater stability against sliding and overturning than the single-wall buttress dam. Also, due to thinner walls, the heat of hydration is more easily dissipated in a cellular buttress. On the other hand, concrete in the more massive buttress can be placed almost with the same ease as in the large blocks of a solid gravity dam.

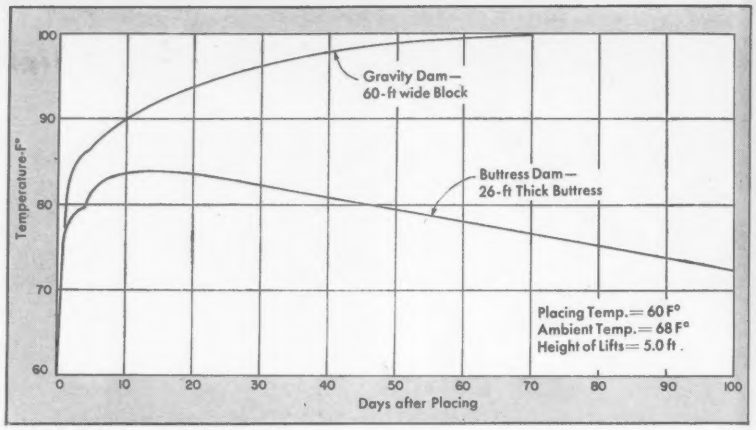
The hollow gravity dam is more of an indeterminate structure than the massive-head buttress, and the likelihood of undesirable tensile stresses occurring in the upstream portion of the cell are much greater than in the latter type. The rate of placing concrete in a cellular buttress is bound to be slower than in a more massive wall. Thus this type would not be suited to a job where a highly accelerated construction schedule is called for.

In the U. S., for example, the larger area of formwork and its complicated nature would necessitate the employment of much more labor for erection and removal of forms than for standard massive blocks, so that the expense for extra labor alone may offset the savings in concrete possible in a hollow block. The massive-head, solid-wall buttress dam would, therefore, stand a much better chance of competing against the solid gravity dam in countries where the labor is expensive and the construction equipment is geared to a fast rate of construction.

• **Design elements**—Features that must be considered in the design of a massive-head buttress dam are: buttress spacing; shape of head; upstream and downstream slopes; thickness of the buttress; construction joints and schedule; joints between adjoining heads; type of foundation; temperature control of setting concrete.

Spacing of buttresses is governed by economy. A greater buttress spacing would mean thicker individual buttresses and also larger heads. For a closer spacing, the buttresses would individually have less concrete in them, but the number of buttresses or "blocks" would be larger. Studies made by the U. S. Bureau of Reclamation for multiple-arch dams indicate that buttress spacings of 50 to 60 ft are the most economical for such dams. However, for hollow gravity dams, spacings up to 85 ft have been used.

Shape of head varies—The basic requirement of the original round-head buttress was that it transmit the entire water load in direct compression to the buttress stem. The round head, with its upstream face circular, was the obvious choice, but other modified shapes have also been proposed and adopted: the "polygonal head", which is a close approximation of the round head; the "diamond head"; and the "massive tee" which has a flat upstream face.



TEMPERATURE HISTORIES show advantage of buttress dam in dissipating heat.

First, the head should be free of excessive tensile stresses, as well as compressive stresses higher than those permissible. Second, the head should be shaped so that complex formwork is minimized. No theoretical method of analyzing the stresses in the massive head is possible, but structural models and photo-elastic tests can be of value.

Slopes and buttress thickness must be considered next. Since each buttress is designed as an individual cantilever block, its upstream and downstream slopes should be adequate to insure its stability against overturning as well as against shearing and sliding. Slopes are influenced not only by stability requirements but also by the size of the head, thickness of the buttress stem, and the nature of the foundation.

Thickness of the buttress depends mainly on two dimensions: buttress spacing and maximum height. The ratio of maximum height to maximum thickness is the "column ratio," and a generally accepted requirement for unsupported single-wall buttress is that this ratio should not exceed 12. However, higher column ratios have been used for some dams, where the buttresses are braced by horizontal struts, or the maximum height used in computing the ratio is not representative of most of the buttresses. Also, where the buttresses rest on spread footings or the downstream faces of the buttresses are flared such as for spillway sections, higher column ratios may be justified. Due to greater aggregate thickness of two walls, the hollow gravity dams generally have a lower column ratio than the single wall buttress dams.

Ratio of buttress spacing to the maximum thickness of the stem varies between rather narrow limits; the average is about 2.8. This ratio is an index of massiveness or hollowness of the buttress dam.

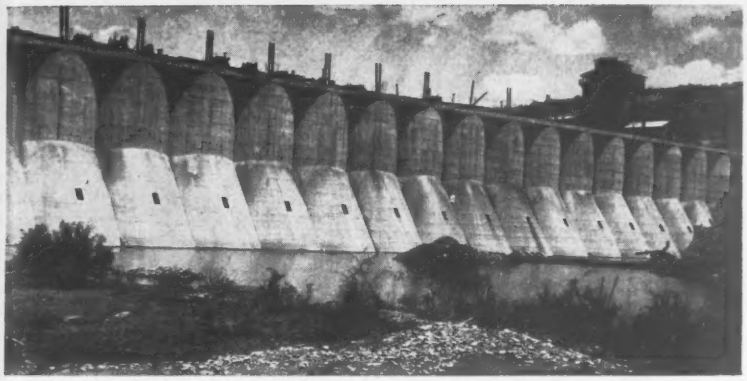
Some dams have uniformly thick buttresses, thereby simplifying formwork at the cost of some additional concrete. Others have tapering buttresses that gradually reduce in thickness toward the top, either in a vertical direction or along a catenary representing a "uniform-strength" column. In a massive buttress nothing substantial is gained structurally or economically by adopting a tapered stem; a stepped variable-thickness buttress is a simpler alternative.

The joint between two adjoining buttress heads is the equivalent of contraction joints between solid gravity dam blocks. Such joints should not only permit independent functioning of adjoining buttresses, but should also be watertight. The contact width of such joints depends on the head of water at a particular location and on the slope of the upstream face. Quite often for the sake of simplicity the width of joint is constant throughout the height of the dam.

To make this joint water-tight, the most common practice is to provide two metal or rubber water-stops between which an asphalt seal is placed, and downstream from these a drain is formed in the concrete. A reinforced concrete key is sometimes provided at the upstream face of the joint, the key being cast after the concrete in the buttress achieves a stable temperature.

In some dams, a slot is left between adjoining buttresses and is packed with concrete or asphaltic felt after the shrinkage of buttress concrete is nearly complete. The buttresses of Glen Shira Dam in Scotland have 5-ft-wide wedge-shaped gaps between them. The gaps were filled with concrete before storage of water in the reservoir.

While all such provisions have been reasonably satisfactory, it should be realized that, with time, a certain amount of sweating would undoubtedly



DON MARTIN DAM built in 1929, is the world's oldest dam of the type.

result at the downstream face of the joint. As long as it does not develop into major leaks, through cracks in the concrete, such a condition can be remedied by heating the bituminous seal with embedded electrical elements, and by cleaning the downstream drains.

To control seepage through the head of the buttress and therefore uplift pressure in that part of the dam, drains are often formed in the head itself.

Temperature control and construction joints must be considered.

The problem of temperature control and the corresponding shrinkage stresses is not of such significance as in solid gravity dams, still it may be quite important in the more massive buttress dams—those higher than 250 ft. Massive-head buttress dams of this height would have a base width of about 200 ft, and it is not possible to place concrete in a block 220 ft long and (say) 25 ft wide without letting shrinkage cracks split it into smaller blocks. Some type of predetermined contraction or construction joints, besides the horizontal—or nearly horizontal—construction joints at each concrete lift, are therefore usually necessary.

The contraction joints have a twofold function: They should facilitate construction of the various parts of the buttress element side by side without any undue delay; yet they should enable monolithic action of the buttress dam block as a whole after the joints have been finally sealed.

Removal of excess heat from concrete in buttress dams is greatly helped by adopting a controlled pace and sequence of construction, as well as by the shape of the buttresses themselves. Nevertheless, in more massive buttresses it may still be necessary to restrict the placing temperature of concrete, or resort to artificial cooling of concrete by circulating cold water through embedded cooling pipes.

However, the advantages that a massive buttress dam has to offer as compared to a gravity dam in the matter of dissipation of heat in concrete are considerable.

Types of foundations vary, but due to its lesser bearing area, a buttress dam exerts higher stresses at the foundations than a comparable solid gravity dam. Such dams, therefore, should require better rock foundations than the gravity type unless spread footings are provided for the buttresses. But massive buttress and hollow gravity dams have been built on a wide variety of foundations. Quality and strength of foundation rock are often responsible for slopes of the buttress and also its area at the foundation level.

In cases where the foundation materials are not only poor in strength but also are unfavorable in orientation, the stability of the buttresses against shearing and sliding is of far greater importance than the bearing stresses.

Also, on the nature of foundation rock depends the extent and type of excavation that would be required for a buttress dam. Individual foundation trenches in rock can sometimes be very expensive and excavation of the entire foundation area would undoubtedly be more than that required for a comparable solid gravity dam.

• **Costs**—All types of buttress dams require more formwork than the conventional gravity dam. This means that while the buttress dam requires less concrete than the gravity dam, the unit cost of concrete in the former would be higher than in the latter. A major part of this increase is due to extra formwork area and its complicated nature.

Consider this comparison: For a 380-ft-high gravity dam the estimated quantities of concrete, formwork area, and unit cost of concrete are 2,420,000 cu yd, 296,000 sq yd, and $18.00 per cu yd respectively. The corresponding items for a comparable massive-head buttress dam are 1,795,000 cu yd, 594,000 sq yd, and $23.50 per cu yd. These rates, analyzed for U. S. conditions,

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. . . Buttress dams

show that while the gravity dam requires nearly 34% more concrete than the buttress dam, the unit cost of concrete in the latter is 30% higher.

But this line of reasoning, based on estimated costs, is contested by Italian designers and builders on the basis of actual experience. The case of the Malga Boazzo and Malga Bissina dams, recently completed, can be cited as an example. Both dams are hollow gravity type structures, but the spillway portion and some of the lower blocks of the Malga Boazzo Dam are of conventional gravity type. The designers have estimated that a hollow gravity dam is cheaper than a solid gravity structure if the height exceeds 55 ft.

It is claimed by the designers of these dams that the hollow gravity type showed a saving of about 35% as compared to the massive gravity dam. The cost of formwork per cubic meter of concrete is stated to be only 1½% higher than that for a solid gravity dam. It is stated that due to the symmetry of the hollow buttress, unit cost for concrete placing in these two dams was actually slightly less than for a solid gravity type. Such economy in construction of a comparatively complicated structure is also undoubtedly due to the fact that the contractor who built these two dams has built several others of this type.

The massive buttress dam has some very attractive features that could influence its selection in preference to the solid gravity dam for certain locations. Shortage of cement and aggregates, remoteness of site, and lower labor wages are some of the factors that add to the advantages of such dams.

Apparently other arguments, besides considerations of theoretical design and predictable economy, need to be answered for U. S. dam builders before this type will be acceptable to them. These are the intangibles, the concealed risks, and the rarely stated argument that the selection of type of structure does not depend only on the estimated cost. Often, factors that cannot be expressed in dollars and cents finally decide the type of dam to be adopted. Some of these are indirect expressions of the degree of risk involved, such as: volume of the reservoir; size of the powerhouse and other works immediately downstream of the dam; and departure from precedence in magnitude of the dam and its design concepts.

While dam designers in the U. S. have been pioneers in the development of massive-head buttress dams, the first dam of this type has yet to be built in this country. Perhaps this is because the dambuilders remain unduly suspicious of novel concepts.

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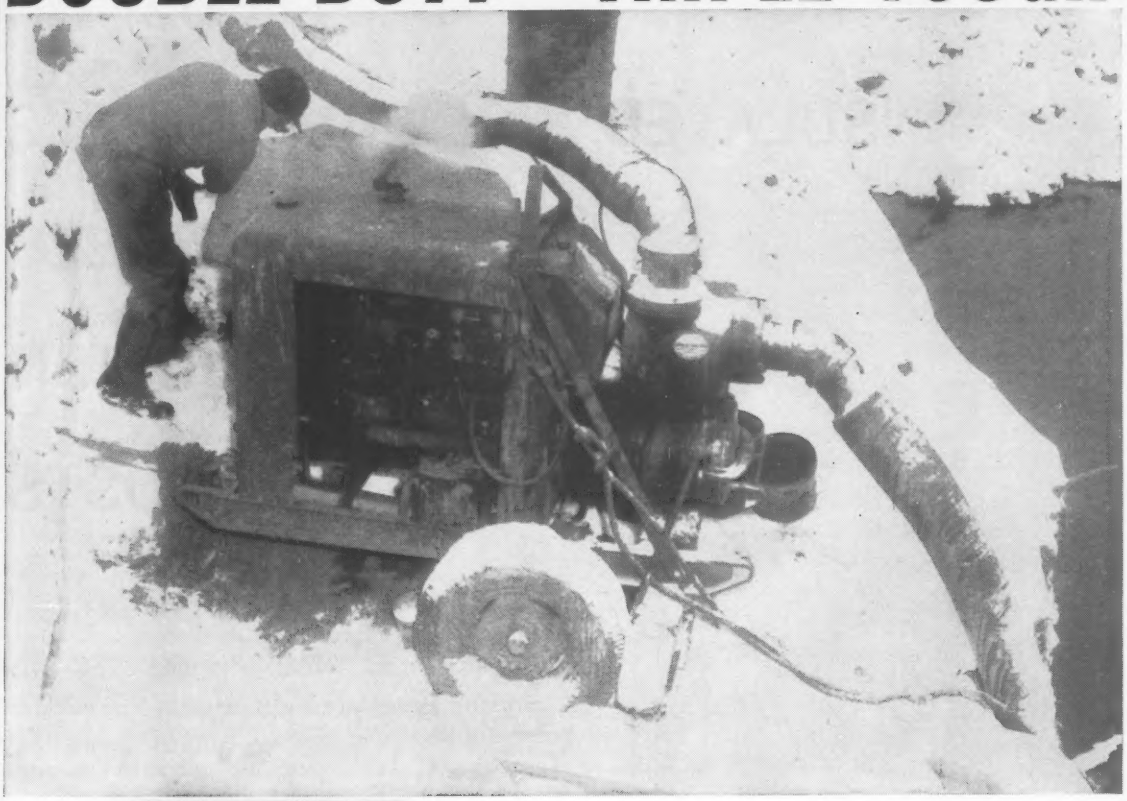

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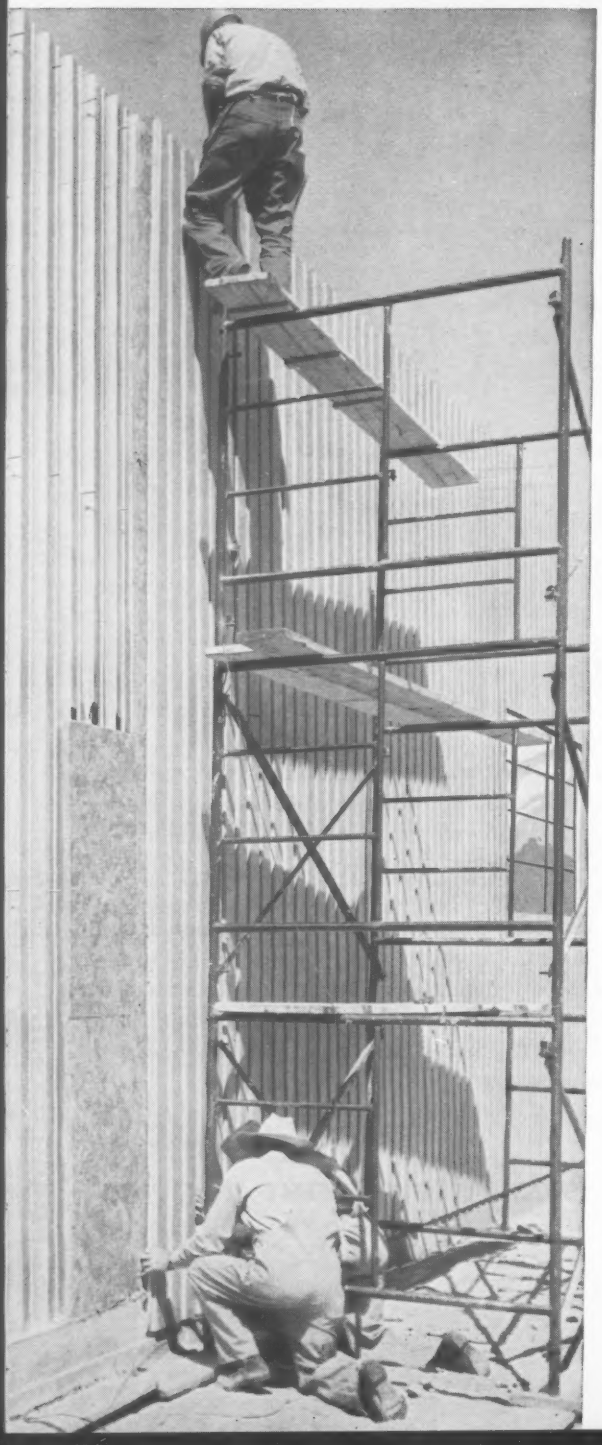

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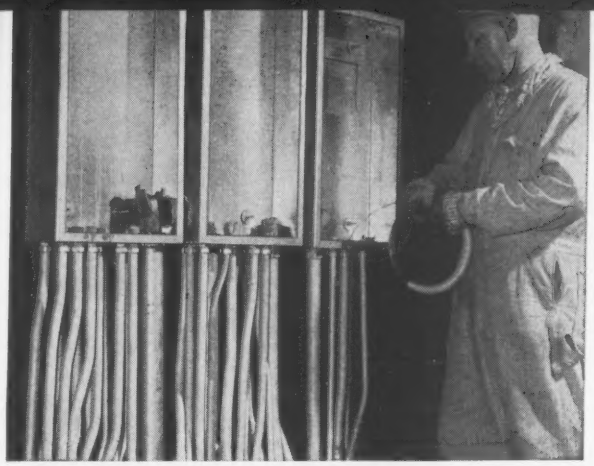

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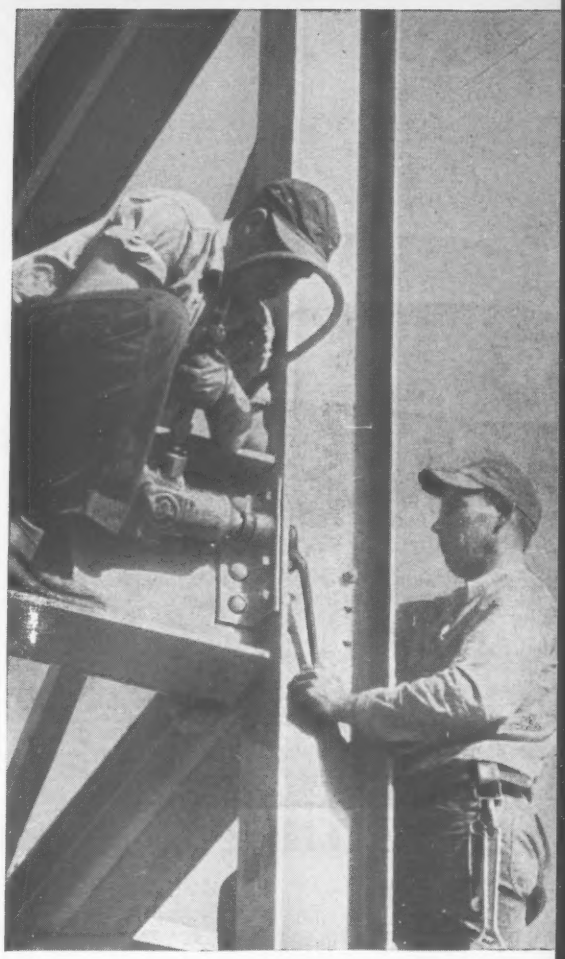

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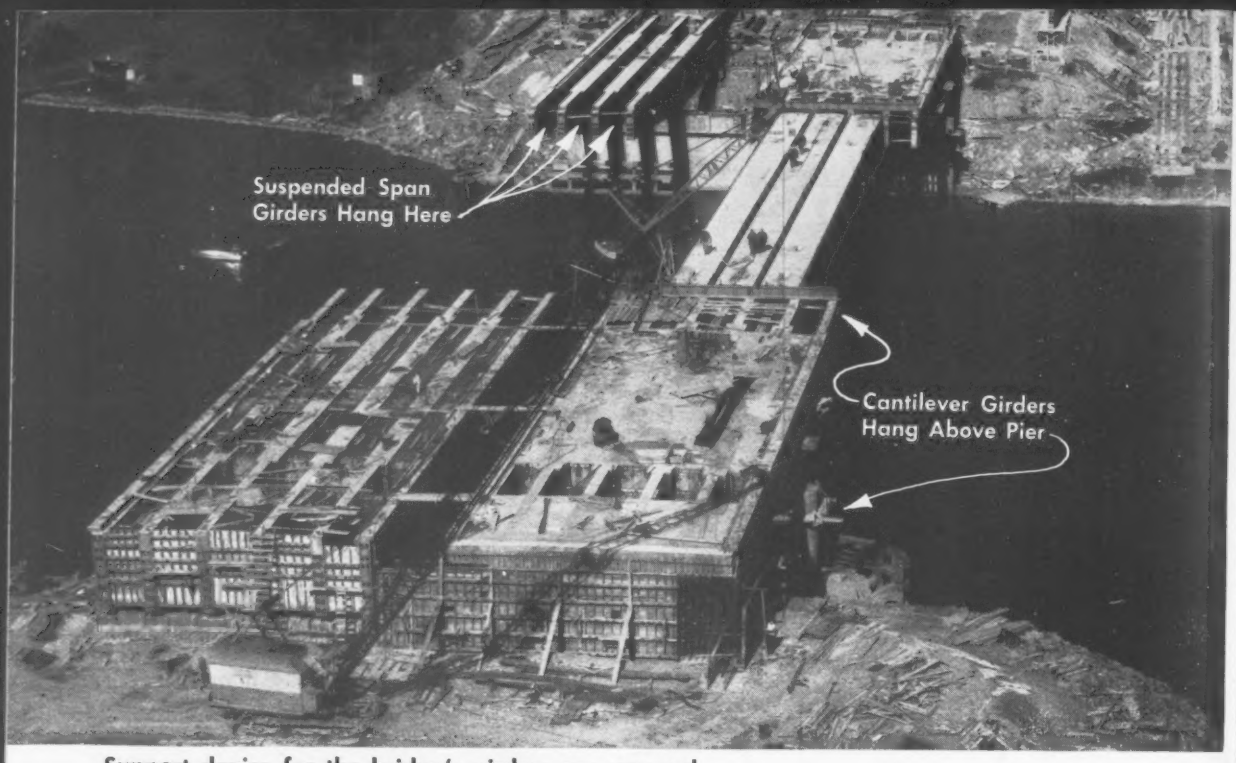


Support device for the bridge's girders are unusual . . .

Setting a Span Record: Prestressed Bri

It's short, as some bridges go—only 460 ft from abutment to abutment—but beyond that, there is little that is conventional about the concrete girder highway bridge nearing completion across Lake Oneida near Brewerton, N. Y. Among other things:

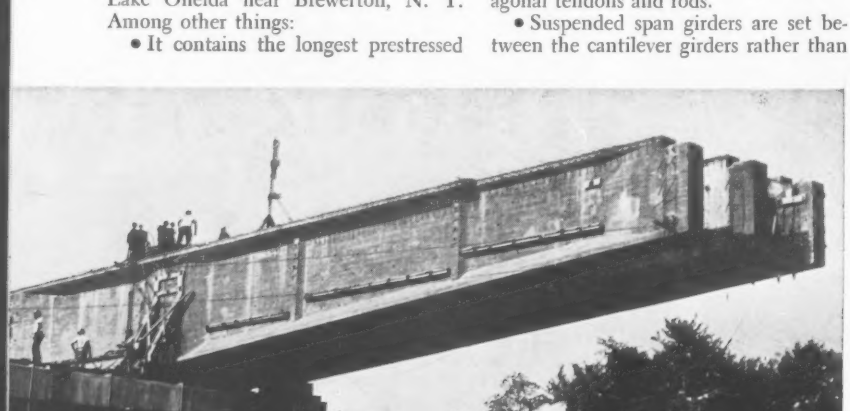
- It contains the longest prestressed concrete span in the western hemisphere.
- None of its cantilever girders—each weighing 250 tons—is supported directly from beneath; all are hung from diagonal tendons and rods.
- Suspended span girders are set between the cantilever girders rather than on them, and are held in place mainly by the action of transverse prestressing tendons.

The bridge has a single set of piers and abutments supporting two separate parallel roadways, which are identical at opposite hand. The superstructure is of counterweighted continuous construction. It contains two side spans of 70 ft each and a main span of a record 320 ft.

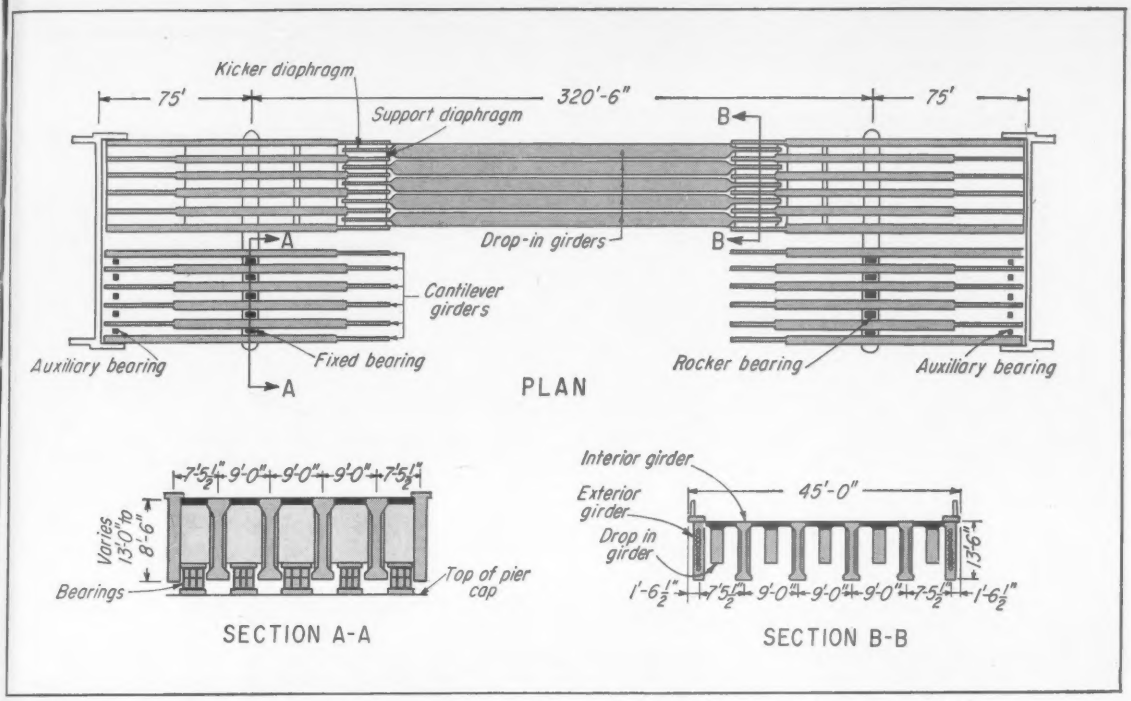
Its 24 cantilever girders are 147 ft long, up to 14 ft high. The ten drop-in girders for the suspended spans are 231 ft long, up to 8 ft 6 in. high, and weigh 222 tons each. All the girders were formed, cast, and partly or completely post-tensioned at the casting bed. They were rolled or barged into place.

The Lake Oneida Bridge will carry Interstate Route 505—a north-south highway running from the New York-Pennsylvania line to the Canadian border—across the lake at a point where it is part of the New York Barge (Erie) Canal. For this reason, a horizontal clearance of 260 ft at water level is needed. Compensation for the skew of the crossing and provisions for piers and fenders pushed the required span to 320 ft.

The New York Department of Public Works had originally planned a tied



Cantilever girder is rolled across temporary bridge to pier.



Bearings are between, rather than under, cantilevers; drop-ins don't bear on cantilevers.

seBridge Has Suspended Girders

arch steel bridge for the site, and twice called for bids on the project. With an engineer's estimate of $1,963,000 at the first letting and $2,204,000 on the second, no bids were received on either call. (In New York State, the engineer's estimate is announced before the bid date, and no bid that exceeds the estimate need be considered.

The State engineers considered raising the estimate to more than $2.3 million. Instead they decided to switch to a concrete structure, but navigation requirements precluded cast-in-place construction. Summers, Munninger & Molke, Albany, N. Y., consultants, were retained to design the structure in prestressed concrete.

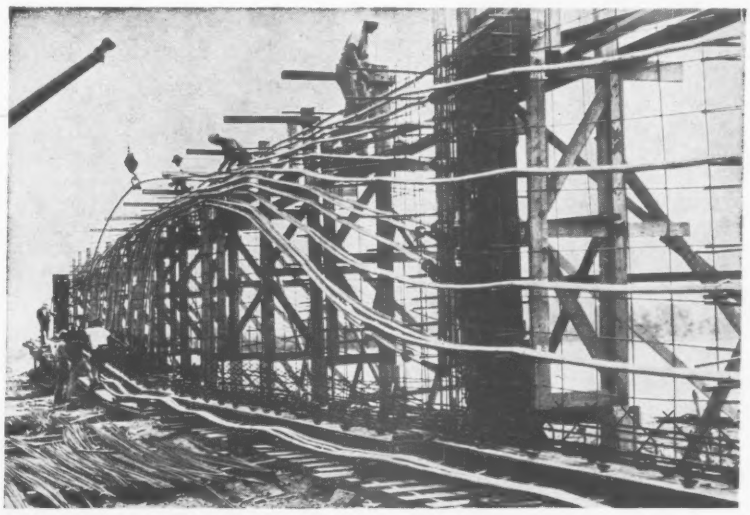
Four bids were received on the first call, and the three lowest bidders were within $30,000 of each other. The job was awarded to Terry Contracting Corp. of New York City, low bidder at $1.7 million for the structure and $0.3 million for approach work.

The unusual design of the bridge was dictated almost entirely by the erection problems foreseen by the engineers.

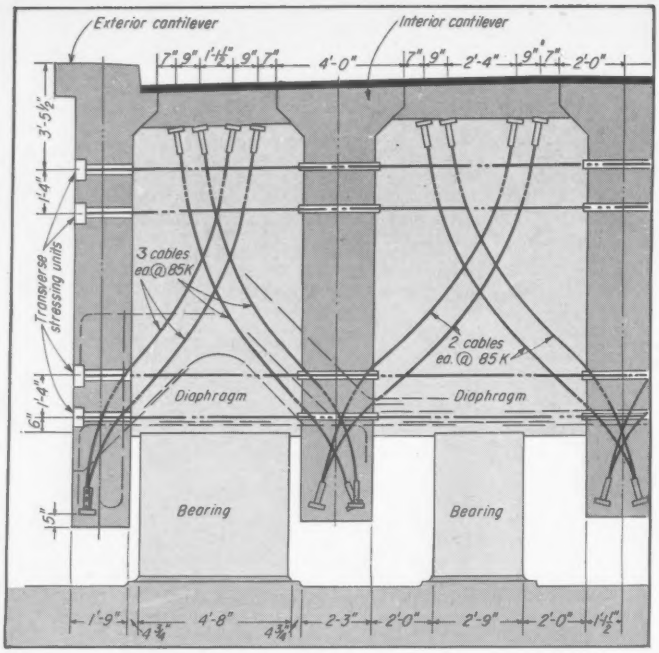
They reasoned this way: The bulk and weight of the girders would make their placement difficult, even under the best possible conditions. Standard design, with the bearings set beneath the girders, would have provided anything but ideal conditions. The bearings would have to be positioned on the piers and abutments; the cantilever girders would then have to be moved, first outward, then transversely, over the top of the bearings, then lowered into place.

This would have slowed job progress, required otherwise unneeded equipment and temporary construction, and increased costs. Of even greater concern was the almost impossible job of keeping bearings and girders in their proper positions during girder placement, alignment and transverse stressing.

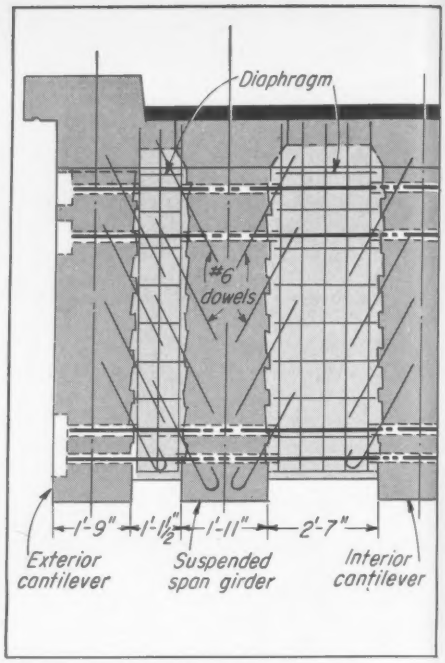
(Turn the page)



Rods and conduit fit in 11-in.-wide web of cantilever.



Cantilevers hang from diaphragm on transverse tendons.



Drop-in girders hang from rods.

The problem therefore was four-fold: find a way to set the bearings after the cantilevers were placed; insure stability of the cantilevers during both the transverse tensioning and the placement of the suspended span girders; provide for placement of the suspended span girders with a minimum of disturbance to the cantilevers and, finally, provide for transfer of the weight of the stressed units to the bearings.

The engineers decided to place the bearings between the cantilevers rather than under them, and to place the suspended span girders between the cantilevers rather than on them.

The cantilevers were designed with transverse tendons extending diagonally upward from the sides at the bearing points, and with rods extending diagonally downward from the sides in the areas of connection with the suspended span girders (see drawing). The suspended span girders, in the area of overlap with the cantilevers, had transverse rods extending diagonally upward from the sides.

With this arrangement, it was possible to position the cantilevers firmly on sand jacks bearing on the piers and abutments, set the bearings at intermediate points, and cast a diaphragm over each one. Through these diaphragms run the suspension tendons of the adjacent girders.

The tensioning of these tendons at the proper time transferred the load of the girders to the bearing block and through it to the bearings. The drop-in girders are hung from the other end of the cantilevers by means of similar diaphragms. Transverse stressing tendons extending across the structure at each diaphragm provide the compressive force needed to hold the girders together.

The design of the Oneida Lake Bridge placed a heavy responsibility on the contractor, who did all the work himself without subcontractors. Having little precedent on which to plan operations, Terry had to develop many of his own methods and much of his equipment. The company spent nine months planning and preparing for the seven months job of casting and placing the girders.

One difficulty stemmed from a difference of opinion on the casting of the girders. Terry wanted to cast them on their sides, then roll them upright. The consultant, however, had designed them for an upright casting, and that is the way they were cast. Thus, instead of reinforcing, stressing and casting an 11 in. slab through a 14 ft opening, Terry had to do the same work on a 14-ft-high form with an 11 in. opening.

It wasn't easy. In addition to a seven-ton cage of reinforcing steel, each of the interior cantilevers contain 28 tendons each 2⅛ in. diameter and each containing 24 or 28 wires of ¼ in. dia. The exterior cantilevers contain 20 tendons, and the drop-in girders have 12.

The Swiss BBRV tensioning system was used. In this system, conduit-encased parallel wires are attached by button heads to the anchorage, and the units are delivered ready for use. Tensioning jacks are screwed into the anchorage, and the stressing is accomplished by moving and shimming the anchorage.

Placing and holding the reinforcing and the tendons in the vertical position required care. So did the casting of the concrete.

Here's how Terry did the job.

Forms were fabricated during the winter of 1958-59 in a warehouse about 11 miles from the jobsite. They were made in 20-ft-long panels of 2-in. sheeting and 2 x 10 braces. After being trucked to the job, they were assembled into 40-ft lengths. At the job site, near the abutments, three casting beds were set up, two on the north approach to the bridge, one on the south.

A heavy transfer track was placed through the center of the casting areas, on line with the 11-ft separation between the two roadways. This track consisted of heavy ties and four, 12 in., 30 lb channels set back down with the flanges pointed upward. The track ran across the abutment and out to the pier on a temporary bridge made of four 36-in. WF 300 beams. The bridge was narrow enough to clear the inside girders of both roadways.

Identical tracks were constructed transversally across the width of the pier and abutment and at corresponding po-

sitions within the casting area. At the junction of the longitudinal and transverse tracks the flanges of the longitudinal tracks were cut out and ground down to permit cross movement of a specially built dolly. The dolly which was roughly 6 ft wide, 9 ft long consisted of a 14 BP 117 section pinned across the top of two separate rectangular frames of 14 BP 53 sections. Endless chain rollers, mounted at the corners of each frame, fit inside the channel track flanges for positive control during girder movement.

The cantilevers were cast first. Soffits were elevated by heavy timbers and timber frames. On the external girders, which because of facias were of greater volume, 9-in. paper tubes were used to create voids and reduce weight. These went in first, and were followed by the stressing tendons. Then the reinforcing. A great amount of temporary framing was needed to properly position these internal elements, and their placement required much care.

After one side form was placed, the steel, tendons and tubes were checked and further anchored. Provision was made for transverse stressing and then the second side form was placed. A 7¾ bag concrete was cast and vibrated through two sets of openings left at 4-ft intervals in the side of the forms.

When the concrete reached a strength of 4,000 psi, the first stage stressing was completed. This involved taking up on eight tendons to support the dead load of the cantilever girder. The transverse tracks were extended beneath the girder, the girder was jacked up, then lowered onto the two moving dollies. Because of the girder balance, the forward dolly carried most of the weight—about 210 tons.

With two special 5-ft run hydraulic jacks providing the push, the girder was moved laterally to the main track, longitudinally across the abutment and pier, then laterally again into its proper location. The beam was then jacked off the dollies and lowered onto sand jacks resting on the pier and abutment. The jacks were made of 24-in. pipe, had a 6-in. run and were lowered by the removal of sand through four previously capped 1¼ in. openings.

When each set of six cantilevers was set, they were spaced with blocking then tied together by transverse rods through each end. Bearings were set between the girders and the bearing diaphragms were cast over them. At the same time, two other diaphragms were cast, one outshore and the other inshore from the pier, and the rear half of the counterweight was cast over the abutment. Stage two prestressing, involving 6 additional tendons, was then performed to compensate for the weight of the drop-in girders. The transverse tendons were also tensioned through the diaphragms already cast.

Suspended span girder is raised from barge by lifting yokes.

The drop-in girders were completely stressed and grouted before they were moved from the casting beds to the barge that carried them to mid-stream. It was imperative that there were no unanticipated stress on the drop-ins when they were being loaded on the barge. To protect against this, Terry cast a concrete slab on the lake-bottom adjacent to the loading area. The barge was then brought in endways and ballasted with water until it settled on the slab. Thus stabilized, the barge was ready for a girder. After each girder was rolled onto the barge, the water ballast was pumped out and the barge refloated.

When the barge was properly positioned between the cantilevers, two sets of contractor-designed yokes were placed beneath the drop-in and connected to frames set across the cantilevers (see drawing). Only one set of yokes was needed for raising each beam; the second set was merely for holding and for safety. Center-hole hydraulic jacks, working on the shafts of the lifting yokes, raised the beam. At the end of each 12-in. run, the lock nut on the holding yoke was tightened and the jacks reset.

When all five drop-ins were properly set in each structure, they were rigidly braced and diagonally tied so they could not move in relation to the cantilevers. The sand was then removed from the sand jacks and the weight of all the beams was transferred to the bearings.

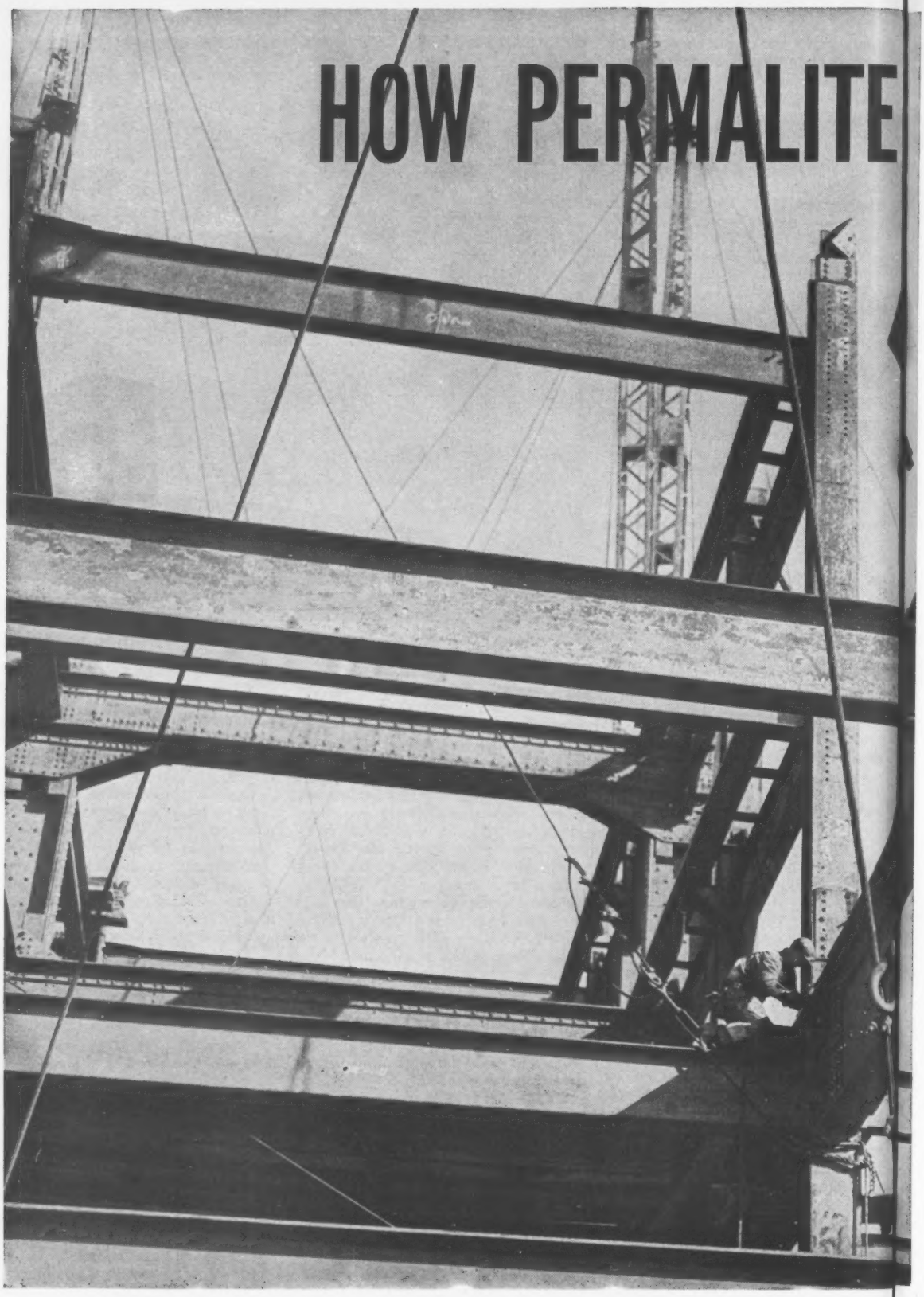
Stage three stressing followed. This completed the longitudinal stressing and compensated for dead and live loads.

With the casting and transverse stressing of the remaining counterweight and diaphragms, the major portion of the work on the bridge was completed.

This spring Terry will place and compact the 14-ft high approach fills to the top of the cantilevers, and will pave the bridge deck.

The structure, which will be opened this summer, will be as maintenance-free as it was possible to make it. Its scuppers are cast iron; its bearings and downspouts are stainless steel; its railings, aluminum. The wearing course will be of bituminous concrete.

The bridge is being built for the New York State Department of Public Works under the direction of Carroll F. Blanchard, deputy chief engineer. Edward Olschewske is resident engineer for the state; Lloyd Monroe is project superintendent for the contractor; and Eric Molke represents the consultants.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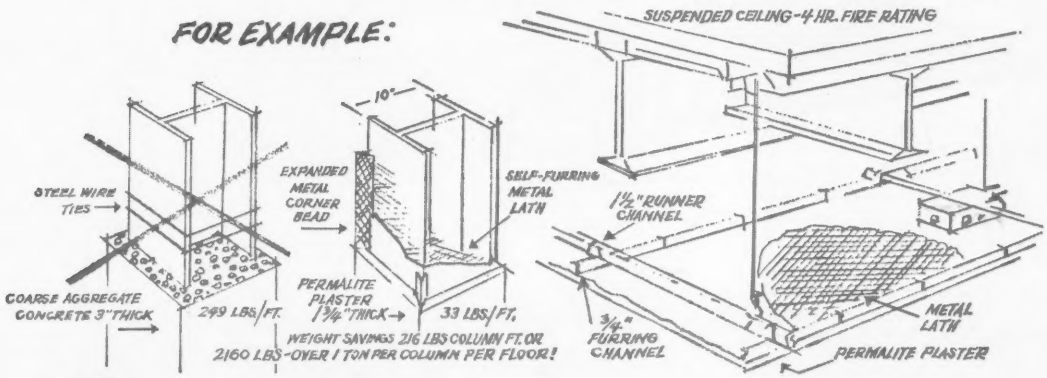

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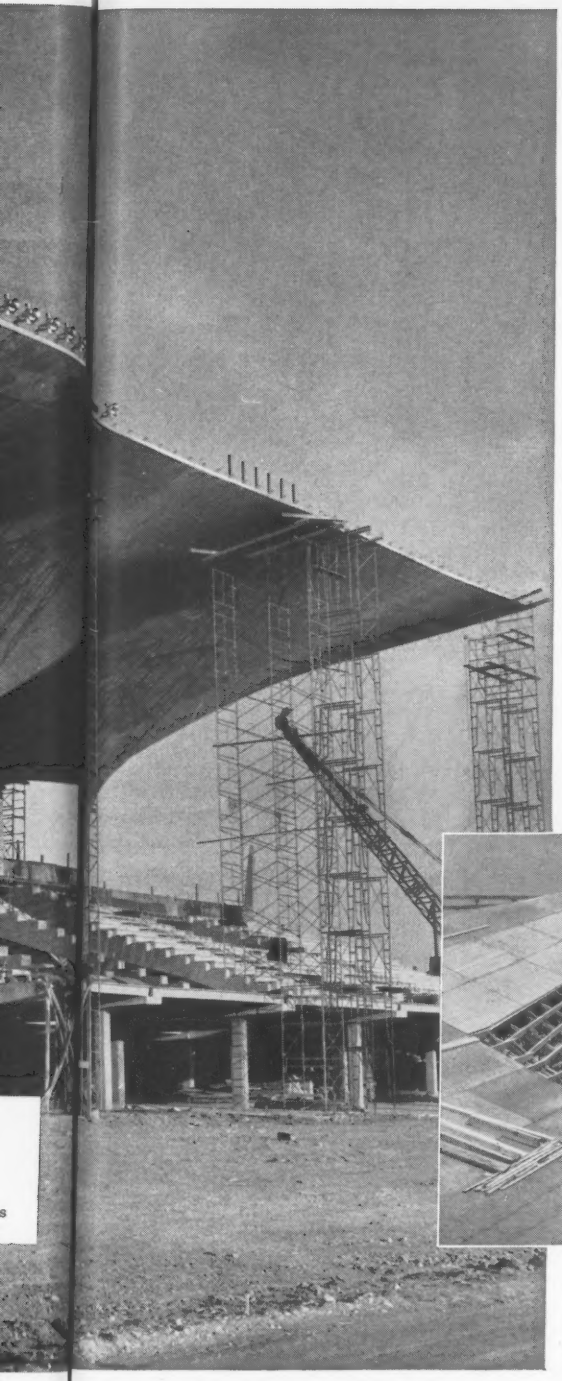

PLYWOOD'S UNIQUE ADAPTABILITY as concrete form material simplified a complicated roof construction job at the Scioto Downs race track, Columbus, Ohio. At the same time, plywood created smooth concrete surfaces and kept costs low.

The striking grandstand roof is a series of huge hyperbolic-paraboloid concrete shells. Each 61 x 116-ft. section is supported by a 44-ft. column. The clubhouse and offices have thin-shell concrete folded plate roofs.

Plywood was shaped so easily to the complex curvatures of the grandstand roof, and made such tight joints, that the contractors found it needed no liner. Original specifications had been for lumber or plywood backing faced with hardboard for surface smoothness. But a single layer of ¾" plywood to do both jobs resulted in a smooth, fin-free concrete surface, besides eliminating the labor and material cost of applying liner.

More savings came from plywood's ease of handling, which the contractors called a real cost cutter. And rate of re-use was exceptionally high. Panels stripped from the grandstand roof were used on the folded plates and were still good for many more times. There was only a four percent loss out of 10,000 sq. ft. of plywood.

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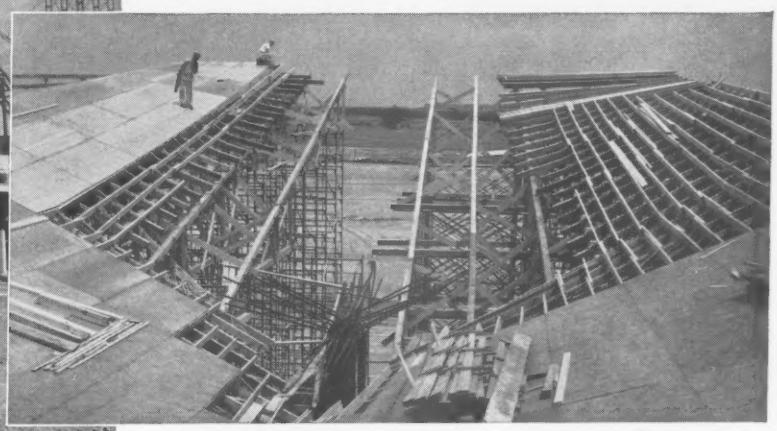
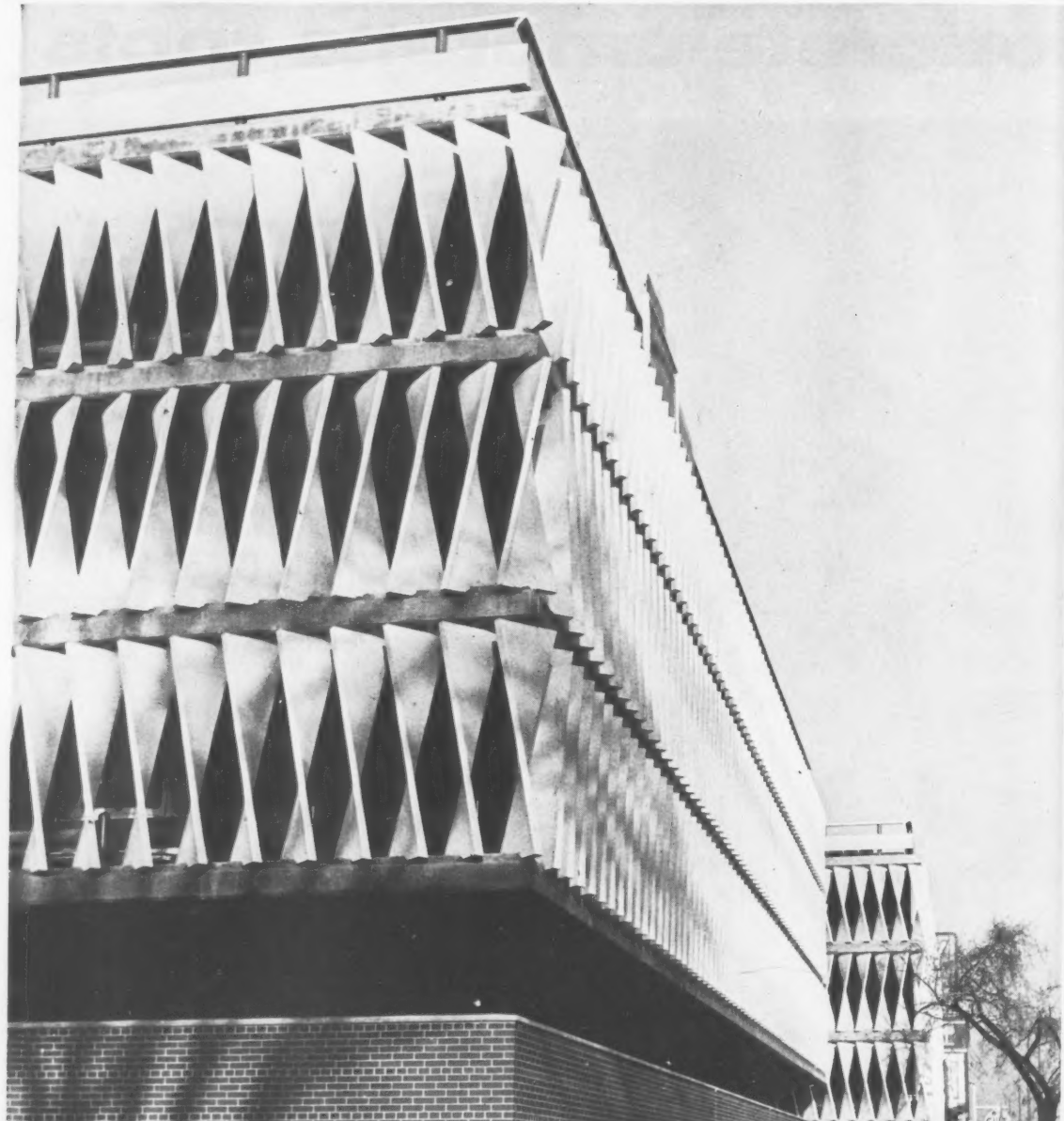


Grandstand roof forms were of ¾" fir plywood over a grid of 2x4's and 2x6's. Panels adapted readily to required curves, yet joints were tight and final concrete surface was smooth and even. Office building behind grandstand and clubhouse at side have continuous folded plate concrete roofs. They were formed against plywood panels previously used on grandstand roof.

Garage Specifications: Beauty and Ec



Striking hyperbolic-paraboloid wall panels cost about the same as brick curtain walls.

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By Alfred Zweig

Hyperbolic-paraboloid precast concrete wall panels provide a striking, economical exterior for the $1.07-million Henry Ford Hospital Garage in Detroit.

Pleasing appearance was more than frosting for this building. Located in a residential neighborhood, the garage required fine architecture to qualify for a building permit.

Cost of the four-story reinforced concrete structure was only $3.70 per sq ft, or $1,225 per unit of its 870-car capacity. And the cost of giving the building the arresting sculptured effect created by the H-P panels approximately equalled the cost of conventional brick curtain walls.

Wall panels are true hyperbolic-paraboloid sections, twisted 90 deg from top to base. They are 24 in. wide at base and top, 18 in. wide at mid-height, and 7 ft 4½ in. high. Panel thickness varies along the edges from 2½ to 3½ in. Reinforcing consists of three #3 vertical and eight #3 horizontal bars. All bars are straight, since the H-P surface is generated by a moving straight line.

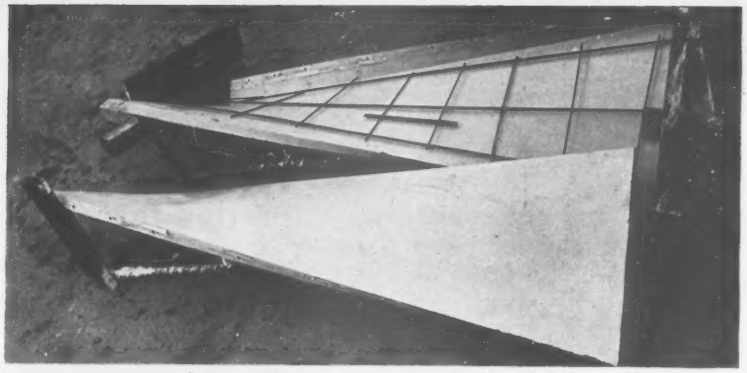
Concrete for the precast panels was a 5,000 psi mix containing coarse aggregate of milky-white quartz, fine Ottawa sand, and white cement.

Major problem confronting Truscon Laboratories of Detroit, panel fabricators and erectors, was how to construct the formwork. First material selected for the forms was concrete. Preliminary trials showed this scheme impractical because of excessive mass and weight. Laminated steel forms also proved very awkward in handling.

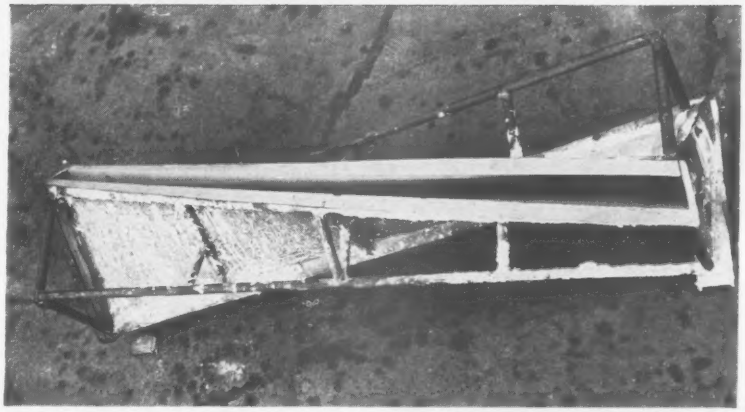
Glass fiber plastic forms, framed with steel angles and stiffened on each face by a steel pipe space frame, solved this problem. A total of 29 formwork units were required to cast 1,716 panels—572 for each of the three upper floors of the garage.

Workmen placed the forms on low, flat tables, vibrating the form sides for best results during casting. One full day after casting, they removed the panels from the forms by simply loosening a few bolts. Then the panels went into a special curing chamber for seven

Mr. Zweig, an associate with Albert Kahn, Associated Architects and Engineers, was structural engineer for this building. He is a fellow of the American Society of Civil Engineers, and a member of the American Concrete Institute and the American Society of Professional Engineers.



Open glass fiber forms have panel reinforcement in place.



Closed form, braced with pipe frames, is ready for casting.

Top clip angles are welded to slab insert after alignment.

Panel bases are grouted into key in floor curb by masons.

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days. Lengths of perforated soaker garden hose suspended from the chamber ceiling sprayed the panels and kept them moist for the entire curing period. Panels were stored for two weeks after curing and then trucked to the job site.

The unusual wall panels required a special agreement negotiated with the unions to apportion the distribution of trades in the erection crew. The eight-man crew comprised two ironworkers, two brickmasons, two laborers, a hoist operator and a superintendent.

A gasoline-powered hoist, mounted on a pick-up truck for mobility, lifted the panels into position. Two canvas strap slings held the 445-lb panels to lessen the danger of chipping or scarring them during the lifting operation.

Panels were notched at their bases to fit over a slotted key in a continuous lug on the floor curb. The designers omitted clip angles at bases to eliminate rusting in this vulnerable spot. Galvanized clip angles bolted to the panel tops were bolted to continuous inserts in the ceiling. After alignment, the brickmasons grouted the bases into special keys, and ironworkers welded the clip angles to the ceiling insert.

Vertical slotted holes in the vertical leg of the clip angles prevented load transfer from the slab above to the panels. Horizontal slotted holes permitted horizontal adjustment.

Garage framing consists of 11-in.-thick flat slabs. East-west interior bays are 27 ft. North-south interior bays alternate between 28 and 32 ft. Slabs cantilever 10 ft beyond exterior columns in the east-west direction and 14 ft in the north-south direction.

The engineer prepared an alternate structural design using prestressed concrete lift slabs with steel columns. This system would have cost 13% more than the conventional flat slabs.

The engineers measured the cantilever slab deflection 3½ months after it was cast. At this time the slab retained over 85% of the specified 1 in. camber, although it had attained over 50% of its theoretical creep.

Camber was based on a deflection calculation for long-term creep, assuming a modulus of elasticity for concrete about one-third of its instant value. The slotted clip angle connections at the panel tops provide for full long-term deflection, for even the slightest load transfer could crack and buckle the slender wall panels.

Production cost for the H-P panels was less than $50 per unit. Form cost was less than 15% of the total.

General contractor was Darin & Armstrong, Inc., of Detroit. Albert Kahn, Associated Architects & Engineers, Inc., also of Detroit, were designers. The writer was Project Structural Engineer.

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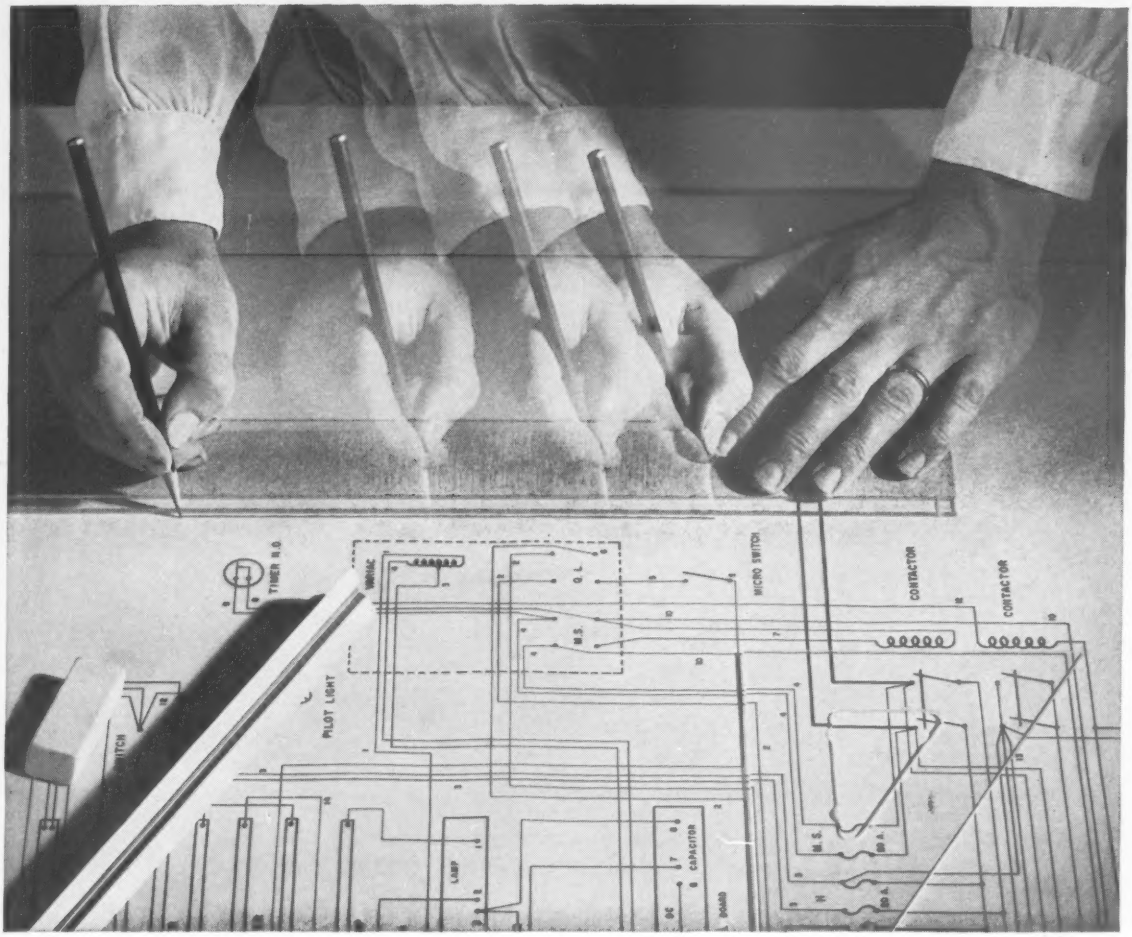

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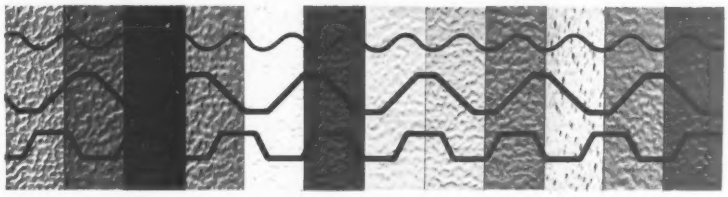

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DAYTON
Aluminum Materials, Inc.
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DETROIT
The Lightmetals Const. Products Co.
27605 Schoolcraft Road
Livonia (Detroit), Michigan

EVANSVILLE
Ohio Valley Hardware Co., Inc.
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Evansville, Indiana

HARTFORD
H. A. Leed Co.
1685 Dixwell Avenue
Hamden, Connecticut

HOUSTON
Metal Goods Corp.
P. O. Box 1452
3530 Rick Road
Houston 21, Texas

KANSAS CITY
Marsh Steel & Aluminum Co.
101 E. Ninth Avenue
Kansas City 16, Missouri

LOS ANGELES
Ducommun Metals & Supply Co.
4890 S. Alameda Street
Los Angeles 54, California

Olympic Steel Prod. Co.
3304 Temple Street
Los Angeles 26, California

George D. Widman Co.
17823 Evelyn Avenue
Gardena, California

LOUISVILLE
Perry Lumber Co.
246 Walton Avenue
Lexington, Kentucky

MEMPHIS
Arkansas Foundry
1434 E. Sixth Street
Little Rock, Arkansas

NEWARK
Chris Andersen Materials Corp.
577 Sayre Avenue
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Beers Steel Bldg. Corp.
413 High Street
Elizabeth, New Jersey

NEW YORK
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Richmond Hill 18, New York

Whitehead Metals, Inc.
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New York 14, New York

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Superior Engineering Sales Co.
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Ogden, Utah

PHILADELPHIA
Edgcomb Steel Co.
D Street below Erie Avenue
Philadelphia 34, Pennsylvania

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Ducommun Metals & Supply Co.
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Garland Steel Co.
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Phoenix, Arizona

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Williams & Co., Inc.
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Pittsburgh 33, Pennsylvania

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Pacific Metal Co.
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Portland 9, Oregon

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Roof Engineering Corp.
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ST. LOUIS
Mississippi Valley Structural Steel
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Anchorage, Alaska

Pacific Metal Co.
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add lasting beauty to your buildings using Industrial Building Products with Alumalure finish made by

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Tractor-Shovel Has 1-Yd Bucket

The Model H-30 tractor-shovel has an operating capacity of 3,000 lb and is equipped with a one cu yd (S.A.E. rated) bucket.

The four-wheel-drive machine has a power-shift transmission with matched torque converter. With three speed ranges in each direction, all shifts can be made "on-the-go" with no need to stop for "range" shifts.

The H-30 is powered by a 77½ hp gasoline engine and has a clearance of 8 ft 4 in. under the cutting edge, with bucket in dumped position. The machine has four-wheel hydraulic brakes. Accessibility, visibility and safety have been emphasized in the design.

Dual foot brake pedals give the operator instant choice of braking with the transmission engaged or disengaged. A lever enables the operator to disconnect the rear (steering) axle-drive for over-the-road travel. The Frank G. Hough Co., Libertyville, Ill.

Integrated Controls for Dragline

Integrated controls are said to greatly simplify and speed operation of a 6-yd shovel or 7-yd dragline, Model 4500 Vicon.

According to the manufacturer, the machine is free from clutch slippage. There are no conventional engine throttles on the machine; each clutch control lever is also a throttle. Engaging a swing or drum clutch, for instance, involves simply pushing (or pulling) the clutch control lever from dead center.

The first 10 deg of control lever movement does not activate the throttle; thus clutch engagement takes place at low engine rpm and almost zero clutch and drum rpm. By continuing to move the clutch control lever, which is also the throttle, the machinery is accelerated via a three-stage torque converter against the load.

Because of the torque converter, no brakes are needed to stop the swinging action. One engine provides the power for swing and travel, while another engine powers the drums. An additional feature for the dragline is an interlocked hoist and drag drum, which maintains the proper relationship of speeds between the two drums automatically. Double drum braking surfaces are provided.

Other features include an oversize radiator system and tubular style dipper stick with separate hoist lines rigged from either side of the shovel bail to the other end of a reduction drive mounted on the base of the shovel boom. Manitowoc Engineering Corp., Manitowoc, Wis.

Lift Sling Made of Rubber Grommets, Aircraft Cables

The "Swing Sling" consists of parallel high-strength aircraft cables covered with rubber grommets, which are secured at the ends by special attachments. The grommets' wide-bearing rubber exterior is said to prevent damage to a coating or other penetrable surface on the object to be lifted.

According to the manufacturer, one "Swing Sling" can handle many lift jobs that usually require two conventional slings. There are five industrial models and two pipeline models, each designed to be used in basket and choker hitch. The Colorado Fuel & Iron Corp., Palmer, Mass.

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MARINE DESIGN MANUAL
For Fiberglass Reinforced Plastics

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Just Published—Gives basic principles, procedures, and numerical examples for design of safe, economical, prestressed concrete structures. Covers materials, pre-tensioned and post-tensioned methods, specifications, bridge and roof design, piles, typical members, continuous structures, and other practical topics. **By H. K. Preston, John A. Roebling's Sons Corp. 360 pp., 136 illus., $11.50**

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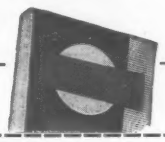

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Advance Progress Report

CF&I-Wickwire develops a

DOUBLE

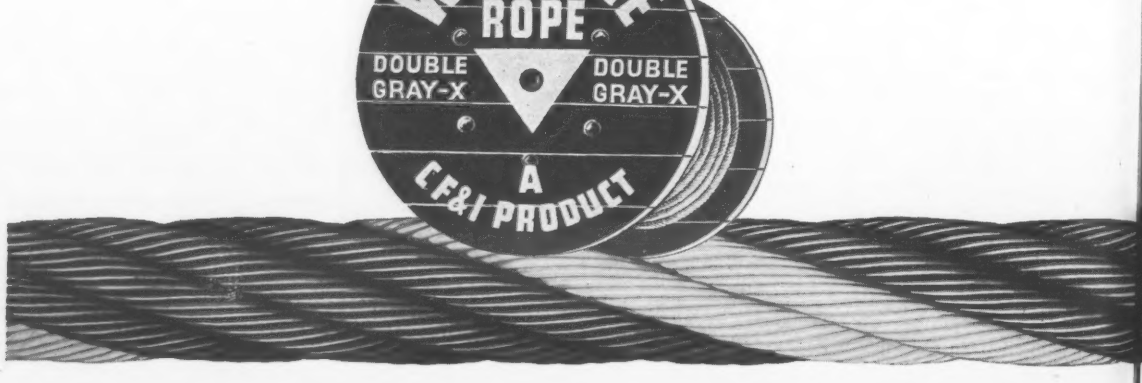
New wire drawing technique gives you longer-lasting wire rope

CF&I-Wickwire's premium wire rope – Double Gray – has now been improved by a remarkable new wire drawing technique. This new wire rope – Double Gray-X – provides EXTRA LONG LIFE.

Wickwire's advanced wire drawing process is the joint effort of our research engineers, metallurgists and key production people. They sought to reduce the friction between the wires within the rope itself, thus producing a wire rope with greater resistance to bending fatigue. An important step in Wickwire's new wire drawing process is the use of *molybdenum disulphide.*

"Moly Disulphide" builds a thin, permanent molecular shield around each wire. Coupled with Wickwire's other advanced wire processing techniques, it gives these results:

- *Friction-free interaction of the individual wires in every strand of Double Gray-X* – A molecular jacket of Moly Disulphide on each wire helps cushion them against the effects of bending, crushing and abrasion. As the rope operates over sheaves, for example, the molecular shield tends to prevent the wire surfaces from grinding against each other, reducing friction and wear.



a superior wire rope

GRAY-X

- *Smoother surface to the wires*—In any wire, tiny imperfections occasionally form on the surface. These "weak links" can cause premature breaking of the wires and impair the life of the rope. Moly Disulphide helps eliminate any minute nicks, creating smoother-surfaced wires.
- *Higher degree of toughness which is essential to longer wire rope life*—Moly Disulphide greatly minimizes the friction involved in the drawing operation, thus preventing the wires from "heating up". This assures the correct physical properties for every wire in Double Gray-X and helps the wire retain its original toughness.

Double Gray-X will be made in a wide range of sizes and constructions to give greater operating economy and reduced downtime for all types of rope-using equipment. It will be available soon from CF&I-Wickwire's chain of warehouses and through a network of nationwide distributors.

EXTRA STRENGTH

In addition to longer life, Double Gray-X gives you the extra strength of Double Gray Wire Rope. Made of extra improved plow steel with an Independent Wire Rope Core, this rope gives 15% higher breaking strength than the catalog breaking strength of an improved plow steel rope with IWRC.

7484

WICKWIRE ROPE

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CF&I STEEL

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso Farmington (N. M.) • Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Odessa (Tex.) • Oklahoma City Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • San Leandro • Seattle • Spokane • Tulsa • Wichita
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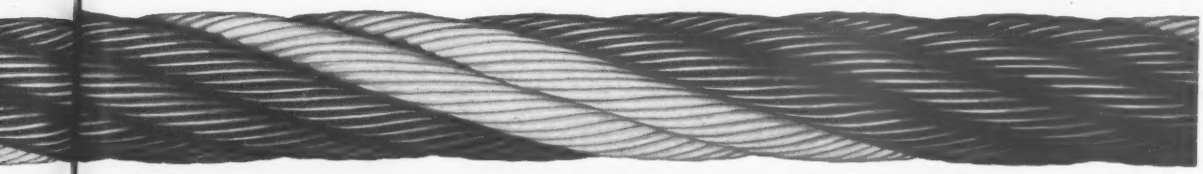
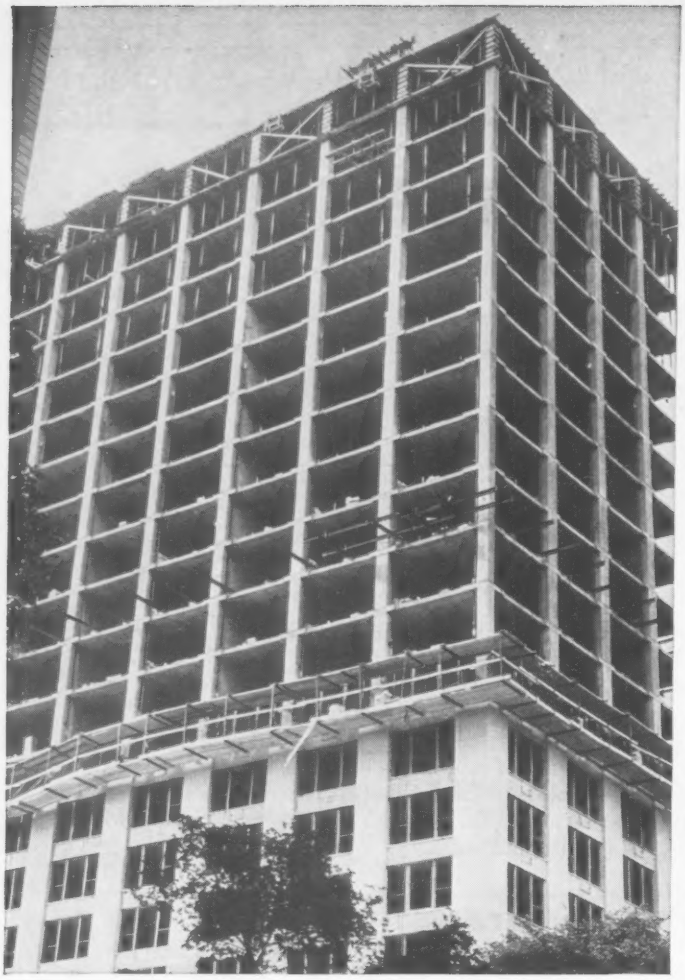




Construction goes fast at 1550 N. Lake Shore Drive. Architects: Shaw, Metz & Dolio, Chicago, Ill. Contractor: Crane Construction Company, Inc., Chicago, Ill.

Here, the 35-story apartment building nears completion

"30 floors in 90 days! Fast construction comes easy with concrete frame and floors!"

Says **MORTON J. CRANE,** *President, Crane Construction Company, Inc.*

"This is the new 35-story apartment building at 1550 Lake Shore Drive in Chicago. With just 3 sets of forms and a precise timetable for concreting, stripping and reshoring, we made fast work of it. From the 5th floor up, we cast one story every 3 working days!

"Planning concrete frame and floor construction this way lets the other trades follow right up. When the 35th floor was cast, the building was enclosed up to the 30th floor, and trim carpenters, lathers and plasterers weren't far behind.

"And with concrete, your material is always right there when you need it. We topped out this job 2 months ahead of time. That means extra rent for the owners."

Such construction efficiencies plus the ready availability and versatility of concrete are good reasons why more and more engineers and builders today are choosing concrete for structures of all kinds and sizes.

FOR STRUCTURES... MODERN **concrete**

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of concrete

AGC's John Volpe . . .

A Man With a Plan

Last week in San Francisco the Associated General Contractors made a president of a contractor who wants to be a governor.

AGC's new president is a young looking 51-year-old Massachusetts builder who's seeking the Republican gubernatorial nomination in Democratic Massachusetts.

John Volpe would be no neophyte at public service; he'll be no beginner at the reins of AGC.

In earlier governmental assignments he's been Massachusetts' Public Works Commissioner, as well as the federal government's acting Highway Administrator for a time.

In AGC he's come up through many years of organizational activity.

Mr. Volpe has served AGC since 1948 on committees concerned with labor, legislation, and other association affairs. Since 1953 he has been on the advisory board, and since 1958 he has been on the executive committee. He was an AGC vice president in 1959.

In his own business, too, he's an administrator of considerable talents. Since a wartime hiatus in which he closed shop completely to serve in the Navy, he has built John A. Volpe Construction Co. into a $25-million-plus contracting concern.

Among this year's $25-million-worth are a missile facility in Bangor, Me., two hospitals in the Boston vicinity, an apartment building and the American Trucking Association headquarters, both in Washington, D. C.; and a $5-million building on the Dartmouth College campus in Hanover, N. H.

All this is a far cry from 1926 when Mr. Volpe's father's business collapsed, leaving the young boy minus a job and the money he hoped would finance an engineering education at MIT.

When this happened young John went to work selling shirts, dresses, and, for a while, coal. But in 1930 he graduated from Wentworth Institute in Boston with a degree in architectural engineering and took his first post-grad job as a $25-a-week timekeeper.

In 1932, the depression cost him his construction job again and sent him back to selling shirts and dresses. But he kept after an opportunity to get a new start in construction, the industry he'd known since boyhood. He joined with a friend to bid on a church alteration job in Everett, Mass., cashing an insurance policy and borrowing elsewhere to do it. Their bid was a second-low, and so were many that followed. Finally, a $1,285 boiler room addition in Lynn, Mass., gave him his start. And except for the war years, John A. Volpe Construction Co. has been going and growing since.

The Volpe company is managed by John Volpe with large amounts of responsibility delegated to junior executives. John Volpe believes that an executive must not hang on to the functions of his office for fear someone else cannot do the job as well. "If the industry is to grow, the delegation of authority must expand in proportion to the business growth."

The man Mr. Volpe relies on most heavily to fill his shoes is Frank Marcucella, who joined his company in 1942 as job superintendent and has since moved up to vice president and general manager.

He also depends heavily on young engineers in his firm and counts six men under 35 years of age on his management staff.

The company has the flavor of a family organization. John Volpe's three brothers are working in executive positions. Peter Volpe is treasurer, Richard Volpe works as a field man, and Patrick Volpe is in the company as a safety engineer.

When Volpe came out of the Navy in 1946 he returned to the contracting business so fast that he bid and won a contract for a new school in a Boston suburb before he had an organization to build it.

But other Volpe men were returning from the war. His organization was soon intact.

As AGC's new president, the energetic John Volpe will put his energies to industry problems he knows intimately.

The greatest threat to the construction industry, he says, is the "do it yourself" theory applied to plant maintenance. He charges that the industry is losing work because of labor agreements made by industrial unions, which forbid the contracting of construction work by large industrial employers.

"Time and time again it's been proven that maintenance by contract is more advantageous than maintenance by industrial workers within the plants. We must continue to sell the advantages of the single contract system even while the industrial workers are moving into the fields of new construction and remodeling."

Looking into his year's term as president of the AGC, John Volpe's goal is a closer working relationship between management and labor. "Labor relationships are more strained than ever,

John Volpe: To prosper, construction needs strong leadership.

partly because of congressional reform measures," he says.

A believer in preventative rather than curative measures, Mr. Volpe thinks labor emergencies can be avoided by sitting around the discussion table before the atmosphere becomes tense.

Sometimes accused of being soft on labor, Mr. Volpe insists that he has fought for the rights of management just as he has fought for the rights of labor.

"We can resolve our problems. . . . I hope President Eisenhower will call management conferences early and establish a continuing body to look squarely at labor and management problems. I would also like to see these conferences followed up on the state and local level".

ACI Elects Joe W. Kelly

The American Concrete Institute elected Joe W. Kelly president and Raymond C. Reese vice president at its annual convention in New York City this month.

Serving on the Board of Direction for the 1960 term are A. Allan Bates, Bruce E. Foster, Ben. C. Gerwick Jr. and James A. McCarthy.

ACI's new chief has been active in the Institute since joining in 1926.

Joe Kelly, professor of civil engineering at the University of California at Berkeley, has been vice president of the Institute for two years and from 1956-58 was on the Board of Direction.

Professor Kelly graduated from Purdue University in 1921 and for seven years was with the Portland Cement Association. In 1931 he joined the staff of the Engineering Materials Laboratory at the University of California. From associate research engineer he advanced to professor of civil engineering in 1939.

In 1934, Professor Kelly received the Wason Medal for his paper on "Cement Investigations for Boulder Dam with the Results up to the Age of One Year." Again in 1946 he received the ACI Construction Practice Award for his work on a paper, "Two Special Methods of Restoring and Strengthening Masonry Structures."

Joe W. Kelly

He is also a member of the Institute's Standards Committee and Committee 611, Inspection of Concrete. As author-chairman of Committee 611, he produced the first three editions of the "ACI Manual of Concrete Inspection."

Obituaries

John Oman Killed In Crash of His Plane

John Oman III, 53, president and treasurer of the Oman Construction Co., Nashville, Tenn., died when his private plane crashed near Nashville March 19. Mr. Oman, a colonel in the Air Force Reserve, was piloting the plane on an instrument landing approach in a snowstorm.

The company Mr. Oman headed has been active on U. S. military construction abroad as well as on domestic work, the latter principally in the highway and railroad field. Abroad, the company has frequently operated in joint ventures with the R. P. Farnsworth Co. and Wright Construction Co. At present it is also associated with Morrison-Knudsen and Kaiser Engineers on military work in Iran.

Notable foreign contracts have included a $4-million air terminal at Dharhan, Saudi Arabia, some $140 million of military construction in Pakistan, ammunition storage facilities on the U.S. bases in Spain, a $1.2-million Inter-American Highway job in Panama, $44 million of airbase facilities in the Azores and $77 million of military facilities of all kinds in Iran. The total of contracts in which the company has shared in the past few years is in the neighborhood of $250 million.

Mr. Oman was a graduate civil engineer of the University of Tennessee and held engineer licenses in a number of states.

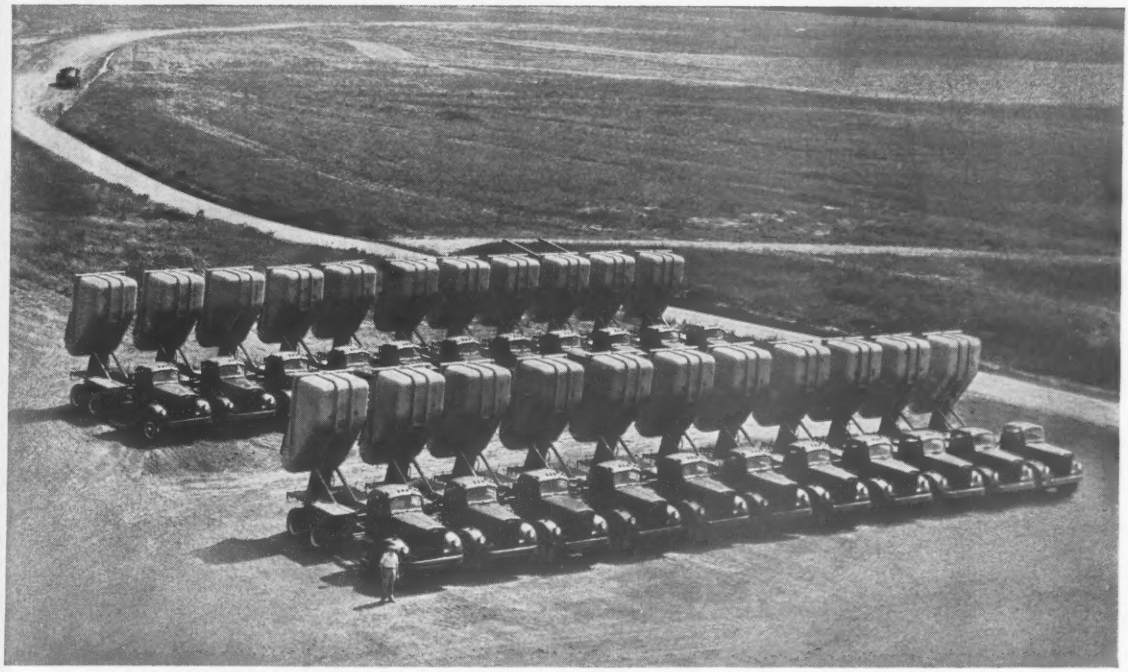
J. Newton Byers, Jr., 69, retired Buffalo, N. Y., engineer. He participated in the erection of several large office buildings in Buffalo.

Earle F. Prout, architect with Howe & Prout, Providence, R. I. A past president of the Rhode Island Chapter, American Institute of Architects, Mr. Prout was also a member of the state board of examiners and registration in architecture.

Fred R. Mosher, 84, with W. A. MacLeod Co., Boston. He worked on the restoration of the Old North Church steeple and Paul Revere house in Boston, and the House of Seven Gables in Salem, Mass.

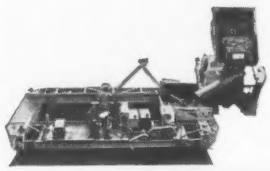
Frank C. Amsbary, Jr., 59, vice president and general manager of the Long Island Water Corp. and former president of the American Water Works Association.

A major contractor speeds big concrete jobs with a fleet of Dumpcretes like this ...and so can you



You handle big yardages of concrete ... fast ... with Dumpcretes. Time and labor savings show up in a hurry on dams, reservoirs, power plants and similar mass concreting jobs. High discharge of Dumpcrete Body permits easy charging of concrete buckets, hoppers or conveyors. Dumpcretes are versatile, too ... when not used for concreting they'll haul earth, sand, aggregates—anything that flows! And Dumpcrete fleets, like the one shown above, really pay off on concrete paving projects!

The best way to get all the economies of the central-mixing, non-agitated hauling method on large *or* small paving jobs is to team Dumpcrete Bodies with Dumpcrete Spreaders. The fast, 90-seconds-from-truck-to-slab cycle of the Dumpcrete Spreader assures a high-production paving spread. And job efficiency improves because Dumpcretes reduce confusion at the paving site. Regardless of the total yardage handled, you can count on Dumpcretes and Dumpcrete Spreaders to cut your concrete placement costs.



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the liquid admixture that gives you 5 key controls of concrete

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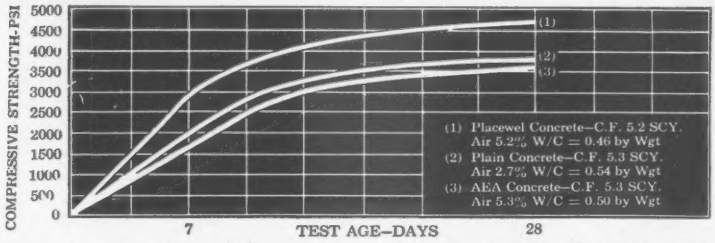
Placewel is a water-reducing, dispersing agent *plus* a catalyst. It is available with or without an air entraining agent. Placewel, by breaking up the cement flocs, releases water for lubrication that isn't normally available. Thus, mixing water requirements are cut without relying on air entrainment alone. The Placewel catalyst enhances the strength-gaining characteristics of portland cement. This unique combination of properties provides a 30% increase in concrete strength (see chart).



Compressive strength – performance of Placewel vs. plain and air entrained concrete

Less than three ounces of Placewel per sack of cement will also –

- Increase durability 350%
- Increase workability
- Improve dimensional stability
- Reduce permeability

J-M Retardwel® is recommended when concreting conditions require longer placing and finishing time. Retardwel delays the initial set of concrete and yet provides higher 24 hour strength.

Architects and engineers the world over have learned that Placewel and Retardwel give them complete control over the concrete they specify. For full information and technical assistance write: Johns-Manville, Box 14, New York 16, N. Y.

JOHNS-MANVILLE

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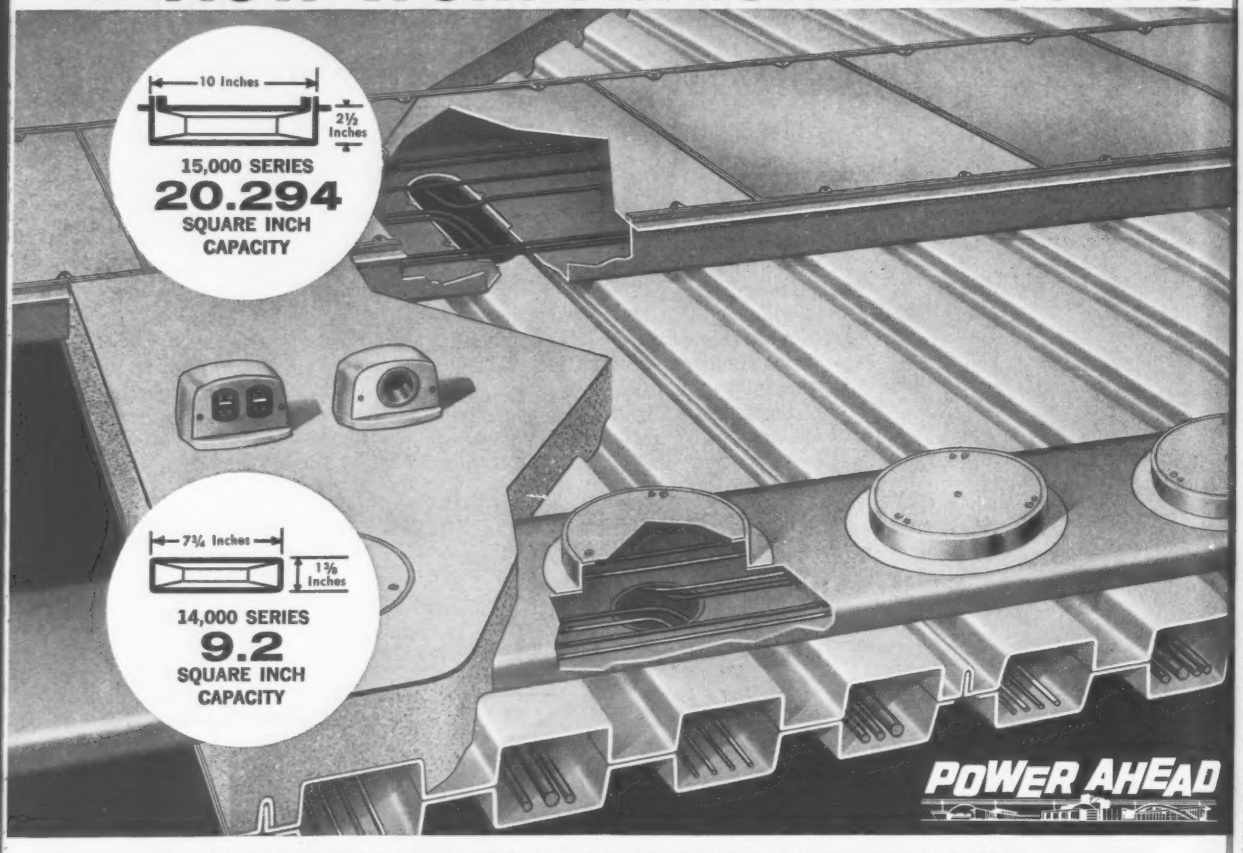
Celite Division

New from National Electric



TWO NEW STANDARD-DESIGN HEADERDUCT SYSTEMS NOW OFFER...

Selected for new $45 million Kaiser Center, Oakland, Calif. NE systems proved flexible enough to meet unique construction requirements and tremendous telephone feeder system wiring load. Welton Beckett & Associates, Architect and Consulting Engineers. Foothill Electric Company, Electrical Contractors.

LARGEST CAPACITY DUCT AVAILABLE

- Greatest wire capacity of any Headerduct provided in a standard design
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Monthly Market Quotations by ENR Field Reporters

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Atlanta	$186.10pe	$154.95pkke	$309.90pe	$348.65pe	.....	.....	$33.20uu	$36.70uu	$36.50hh	$28.50hh	$28.50hh
Baltimore	217.00	231.00	434.00	491.00	602.00	690.00	36.00	41.00	35.80	23.40	.....
Birmingham	135.00pss	152.00pss	.....	303.00p	376.00p	465.00p	27.00ff	38.00jj	38.28mm	20.87mm	26.33gmm
Boston	232.00†mm	248.00†mm	463.25†mm	556.00†mm	.....	.....	43.50p	58.00p	42.00§	34.00§	.....
Chicago	137.00ll	149.00ll	280.00ll	.....	.....	.....	32.00	34.00	38.00ll	35.20ii	.....
Cincinnati	179.00mmyy	190.00†mmyy	355.00jddmm	390.00†mmyy	422.00†mmyy	500.00†mmyy	48.00jk	47.00jk	29.10†mm	29.10†mm	29.10†mm
Cleveland	205.00tt	219.00tt	.....	465.00tt	.....	709.00tt	41.75tt	45.75ggtt	32.75ptt	28.00ptt	.....
Dallas	155.00	155.00	306.00	370.50	452.25	560.00	30.00	50.00	41.80	34.58	28.50
Denver	170.00	185.00	310.00	390.00	442.00	535.00zz	54.00	.....	48.00p	42.00p	46.00p
Detroit	257.00mm	274.00mm	514.00mm	582.00mm	767.00mm	876.00mm	53 50pmm	54.00pmm	38.00mm	30.00mm	40.00mm
Kansas City	158.00	158.00	312.00	312.00	400.00	500.00	34.00	34.00	36.26	34.26	29.76
Los Angeles	r	r	r	r	r	r	38.00uu	.....	38.00nnll	38.00nnll	39.00nnll
Minneapolis	208.00pe	225.00pe	452.00pe	225.00pwe	.....	.....	49.00epe	57.50ype	50.00bbe	40.00bbe	52.00bbde
Montreal	168.78augoo	180.93augoo	325.00augoo	220.00goo	400.00goo	.....	48.25ll	56.30bii	39.00	32.00	13.25
New Orleans	198.00	198.00	370.00	370.00	.....	.....	42.00	55.00	44.00	32.00	32.00
New York	185.00h	197.00h	294.00ch	297.00hn	.....	.....	46.00p	.....	40.00p	38.00p	.....
Philadelphia	202.10ss	215.60ss	404.20sszz	485.10ss	.....	.....	42.00mm	50.00mm	40.00mmp	21.50	21.50
Pittsburgh	200.00t	213.00t	400.00t	453.00t	607.00t	693.00t	39.00t	46.00t	38.00tt	33.00†t	34.00t
St. Louis	180.00mmpp	190.00pp	385.00pp	401.00ppp	459.00pp	621.50pp	44.00mmpp	45.50pp	1.00aapp	.80aapp	1.35 aaapp
San Francisco	156.85*mm	177.10*mm	235.30dd*mm	159.40qqmm	.....	.....	43.00*mm	43.00*mm	29.24mm	29.24mm	31.74mm
Seattle	235.00pt	270.00pt	490.00pt	265.00pwt	.....	.....	57.00t	71.00t	32.00bbt	38.00bbt	4.50mbbt
Toronto	158.00rr	178.00rr	336.00rr	263.00frr	378.00rr	.....	27.00rr	65.00rr	40.00mm	36.50mm	34.50mm

*$ F.o.b. yard. **• F.o.b. plant Stockton. *† F.o.b. yard Roxbury. *a Smooth. *b $4.50 del. *c 8 x 12 x 12 in.-6 cell. *d Pulverized hot. *e less 5% disc., 10th., 8" 8 x 8 x 12. *g Lumps, $26.72. *h F.o.b. trucks, job site N.Y.C. *i 60 lb sacks. *j Truck load or over. *k $1.00 discount per M, 10 days. *l Red face. *m Per bb. 180 lb. processed. *n 7¾ x 7¾ x 12. *o Mason's double hydrated pressure. *p Truck lots. *q Provincial and Municipal tax extra (8%). *r Not used; earthquake danger. *s 8 x 16 x 12. *t less 2% disc., cash. *u Incl. Federal tax. *v Sand lime. *w 6 x 8 x 12. *x dumped. *y Chi common. *z Pebble; 80 lb sack. *aa 50 lb sack. *bb LCL. *dd 6 x 12 x 12. *ff 80% common. *gg Smooth. *hh less 25¢ disc., cash. *ii F.o.b. plant. *jj rough; smooth; $40. *kk 3½ x 11½ x 11½. *ll less 2% disc. 10th. *mm less 2% 10 days. *nn F.o.b., L. A. *oo less 2% 30 days. *pp add 2% sales tax. *qq 8 x 5½ x 11½. *rr 2½% disc., 10 days. *ss 8% disc., 10 days. *tt less 2% disc., 15th. *uu less 50¢/M. 10 days *vv 4000 pcs. and over.

PAINT, ROOFING—F. O. B. CARLOAD LOTS

	RED LEAD Per 100 lb. In 600 lb. (Approx.) bbl. F.O.B. Plant Dry a C	WHITE LEAD Per 100 lb. In 100 lb. cases In oil	READY-MIXED PAINT Per gal., drums Graphite b	Aluminum c	Ferric Oxide d	ROOFING SUPPLIES; Carload lots f.o.b. factory Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 360 lb. bbl. per ton
Atlanta	$13.75ggJO	$24.00ggJ	$3.59	$3.86	$3.31	$2.90kk	$2.25kk	$2 85kk	$0.67kk	$65.35kk
Baltimore	17.50pp	24.00	3.00	4.40	3.50	3.06	3.67	4.04	.50	54.00
Birmingham	26.00†J	29.00†J	3.90J	5.40J	....	3.08†mm	3.28ii†mm	2.28ii†mm	.75ffmm	45.00eemm
Boston	24.95†oomm	26.90†mmm	....	....	....	3.74g	2.48g	2.83g	.55g	58.00p
Chicago	15.25rJqqpp	24.00†J	....	....	....	3.80ukk	2.76ukk	3.00ukk	48.00bbkk	57.70†kk
Cincinnati	15.25†JO	24.00†J	....	....	....	2.87mm	2.02mm	2.42mm	.428ymm	55.96Hmm
Cleveland	25.65†	26.90†	2.53ggP	2.81zzgg	3.46qqg	2.74q	2.11o	2.42o	.39y	49.00qq
Dallas	22.50	23.50M	....	3.25B	....	3.00u	3.00o	3.00o	.470	66.00kk
Denver	23.00n	24.00	3.98	5.20	3.70	2.86	2.12o	2.80o	.50ff	50.00
Detroit	15.75r	24.00rr	2.70mm	3.95mm	2.70mm	2.82mm	2.05mmll	2.42mmll	.56ffmm	49.00mm
Kansas City	26.90lqqoo	25.65	3.99	3.43	3.01	4.01mm	2.77mm	2.77mm	.82y	.....
Los Angeles	16.25yy	22.00	3.30n	4.50n	4.20n	3.40nkk	2.40niikk	l	.75mykk	l
Minneapolis	16.75N	21.50kk	.....	.....	.....	2.50kk	1.95hikk	2.36hikk	.416ikk	50.00rkk
Montreal	19.45O	26.00wtt	5.52Dft	6.55xff	5.10kft	5.40	4.65f	4.65f	1.60	4.40uu
New Orleans	23.00Jpp	24.00J	....	....	....	2.78	1.98	2.85	.680	45.50
New York	15.25ooO	29.75	....	....	....	2.81zz	2.06zzo	2.47o	.52s	49.00*
Philadelphia	16.25Omm	24.75mm	3.35mm	3.90mm	2.65Rmm	4.70	3.60	2.85	.515	50.00
Pittsburgh	21.00mggJ	24.00J	2.20qEJ	2.25tFJ	2.25tGJ	3.57aH	2.75aH	2.95H	.48H	55.00H
St. Louis	25.65†m	26.90	.....	.....	.....	3.28iimm	2.35hhK	2.82hhK	.43yK	62.00K
San Francisco	26.70mm	26.90mm	3.20mm	4.30mm	3.50mm	2.87mm	1.72aaimm	2.59mm	.46ff	54.00
Seattle	13.35HO	24.00H	.....	4.19ccffJ	.....	3.70qccH	3.06hccH	.....	.55cc	.....
Toronto	14.45	20.65	5.15J	6.18J	5.95J	3.00	2.40aae	2.40o	1.01j	50.00A

*† Delivered. *Note: Red lead in oil 50% higher than white lead in oil. **• Aver. wt. approx. 425 to 550 lb drums. *a Red lead prices change frequently due to pig lead price changes. *b U.S. War Dept. Spec. 3-49A. *c ASTM Spec. D266-31. *d 80% minimum ferric oxide. *e Per 108 sf roll. *f Per 432 sq ft. *g F.o.b. yard Roxbury. *h Per roll, 65 lb. *i Net carload prices, Minneapolis and vicinity. *j 45 gal containers. *k Over 80% ferric oxide. *l Not used. *m 100 lb. keg. *n F.o.b. city. *o Per 80 lb roll. *p 6-drum, 50 gal each. *q Per 90-lb roll. *r F.o.b. factory, Chicago. *s Truckload. *t Incl. Federal tax. *u Per 90-lb square. *v Per ton. *x Ready-mixed. *y 55-gal container. *z Drums. *aa 15 lb. *bb Roofers coating and cement. *cc LCL, truck delivery. *ee Asphalt pitch in 100 lb package *ff 5-ga drums. *gg F.o.b. factory. *hh Incl. freight. *ii Per 324 sf roll. *jj Asbestos roof coating. *kk less 2% disc., 10th. *mm less 2% disc., 10 days. *oo 100 lb bbls. *pp 50 or 100 lb bags. *qq 500 lbs or more *rr F.o.b. plant, Detroit. *ss 50 lb bbls. *tt 25 lb kegs. *uu 250 lb bbls. *xx Sept.: Rolls revised to $2.75, Asph. Felt revised to 1.71. *yy Sept. revised to $12.00. *zz Sept. revised to $2.80. *A 400 lb barrels. *B ASTM Spec. D962-49. *C 95%. *D Std. black. *J Milt. spec.: E TTP27; F TTY91; G TTP31. *H less 2% disc., cash. *I Per 100 lb. *J less 1% disc., 10 days. *K add 2% sales tax. *L CL. *M 1 ton or more. *N under 500 lbs, add $1. *O 50 lb. bag.

PLASTER, VERMICULITE AND METAL BUILDING SHEETS & TUBING

	PLASTER‡ Neat per ton	Gauging per ton	VERMICULITE‡ Home Insulation pellets	Plaster aggregate	Concrete Aggregate Untreated	PERLITE‡ Plaster Aggregate	Concrete Aggregate Untreated	ALUMINUM Flat .100" th 36"x108" & 48"x144" per lbjt	SHEET† Corr roof .032" th 35"x12' per shu	STAINLESS STEEL† SHEET-TYPE 302g 20 ga 48"x96"–120" per cwthh	26 ga 36"x120" per cwtmm	COPPER WATER* TUBING-TYPE L 2000 ft lots per ft ¾"b	½"c
			per bag of 4 cu ft										
Atlanta	$32.00ss	$42.00ss	$1.55sss	$1.65sss	$1.80slss	$1.65ss	$1.65ss	$0.463noo	$27.17nY	$65.68nxx	$74.43nxx	$0.1762ss	$0.2464ss
Baltimore	24.00	35.70	0.95	1.15	1.15	1.15	1.55	0.462	0.451r	63.00	71.25	0.16	0.23
Birmingham	37.00ss	43.00ss	1.55ss	1.55ss	1.60lss	1.27ss	1.27ss	0.458M	9.62K	67.34K	76.09K	0.20ss	0.27ss
Boston	24.00	30.00	1.40	1.40	1.40	1.55ss	1.55ss	0.462	24.66pAA	64.42dd*zz	72.67dd	0.1762ss	0.2464ss
Chicago	26.80tt	26.80tt	1.55	1.60	1.60l	1 60	1.60	0.516x	32.88p	64.15ee	72.40ee	0.1814	0.2545
Cincinnati	23.85*ss	23.85*	1.75*ss	1.75*ss	1 85*ss	1.85ss	1.90ss	0.514	9.21	65 30xx	74.05xx	0.1814ss	0.2545ss
Cleveland	28.00N	45.00N	1.14ss	1.16ss	1.24lss	1.45ss	1.45ss	0.455xs	8.48	63 33ooxx	71.58ooxx	0.1814tt	0.2545tt
Dallas	30.65	30.65	1.05	1.21	1.37	1.21	1.32	0.452	0 451r	64 09	72.34	0.1668	0.1986
Denver	37.00	27.00	1.50	1.40	1.50	1.50ss	1.60ss	0.475	10 89	65 32gg	73.57gg	0.1772	0.2380
Detroit	28.00ss	28.00ss	1.27ss	1.31ss	1.40ss	1.45ktt	1.50ktt	0.475s	10 35s	63 .00zzz*	71.25zzz*	0.2058	0.2887
Kansas City	30.00	35.00	1.19E	1.21E	1.29lE	1.21	....	0.463	24.66ggvvp	67.50E	76.25E	0.1814	0.2545
Los Angeles	27.00tt	28.00tt	1.25ktt	1.20ktt	1.45tt	1.11	1.11	0.515	0.772	65.02	73.27	0.1814	0.2545
Minneapolis	35.00F	35.00F	1.65kt	1.80F	1.95F	1.40S	1.50S	0.495	16.23	63 61GR	69.61fG	0.1446f	0.2025
Montreal	27.60h	35.60h	1.25h	1.40h	1 60h	1.15s	1.15s	43.95AH	12.10H	65.75H	.....	0.1840	0.2187
New Orleans	34.00	48.00	1.25P	1.35P	1 45P	1.21P	1.21P	0.526	24.90	64.00Y	85.60Y	0.1814	0.2545
New York	27.00	35.00	1.40	1.35	1 40	1.35	1.45	0.485aT	0.2466aXAA	64.08a	72.33a	0.1723	0.2318
Philadelphia	26.50	31.00ss	1.40ss	1.40ss	1.55ss	1.35ss	1.35qqss	0.485	9.46	63.71	71.96	0.1814	0.2545
Pittsburgh	30.00nn	33.00nn	1.50nn	1.50nn	1.50mm	1.50nn	1.50nn	0.452	9.46	64.00	76.25pp	0.1441	0.1900
St. Louis	30.00uu	42.00uu	1.50uu	1.80uu	1.65uu	1.50uu	1.60uuY	0.475	10.69	65.39Kmm	71.89yuu	0.1814fmss	0.2545fmss
San Francisco	29.50ss	30.50ss	1.38ss	1.38ss	1 50ss	1.38oss	1.38oss	0.575	10 83	65.00K	77.25K	0.1814	0.2545
Seattle	42.40nn	45 60nn	1.55nn	1.25knn	1.85lnn	1.50k	....	0.46D	10.40D	64.02D	73.27D	0.1756	0.2460
Toronto	.82	1.31	1.45	1.45	1.60	1.20Q	....	0.4295	26.00ap	73.74	86 52	0.3063	0.3418

‡trucklots, delivered †fob warehouse *fob city *a delivered *b ½" O.D. *c ⅝" O.D. *d per sf *e 34" x 60" sheet *f per 100 ft *g 5 tons & up; cold roll, anneal & pickled 2B finish *h Incl. Federal tax *i add 25¢ for pint of additive *j 1100 & 3003 alloy, mill finish *k bag of 3 cu ft *l treated with air entraining agent *m 2-10M ft *n fob mill fr equalized with nearest stocking competitor *o 250 sacks or more *p 100 sq ft *r per lb *s 30 lb bag *t 36" x 196"-10.81 lb/sh; 48" x 144"; 21.7 lb/sh *u 19.31 lb/sh *v fob plant *w 48" x 144" *x 0.11"th *y 27 gauge *aa 16M lb & up *bb Per 50 lb bag *dd add $1.00 cwt boxing *ee 4 tons & up *gg add $2/cwt boxing; $0.75/cwt on skids *hh Theoretical wt for 48" x 96"; 60.4-lb. per sh *ii 300-bag lots *jj 100-lb bag *mm Theoretical wt; 19.7-lb per sh *nn 2% cash *oo skid packed *pp type 304 *qq Philadelphia and suburbs. *rr less 2% disc. 15 days. *ss less 2% disc. 10 days. *tt less 2% disc. 10th. *uu add 2% sales tax. *vv Type N. *xx less ½% disc. 10 days. *yy .021 ga. *zz .061" th. *A Per 100 lb. *C 15M lb. *D less ½% for cash. *E Quantity differential. *F less 5% disc. 10th. *G less ½% disc. 10th. *H Fed. tax exempt. *K less ½%, 10 days. *L 5% disc. 30 days. *M 3003: .452 for 1100. *N less 2% 15th mo. *O less $2, cash & carry. *P less 2% 15 days. *Q per ton. *S add .10/bag under 200 bags. *T 5000# quantity on 4000# skids. *U 30 Msf quantity; $0.245 in 10 Msf quantity. *X per sq ft. *Y Per sheet. *Z 6,000 lb or over. *AA 30,000 sf or over.

Labor and Materials Prices

Monthly Market Quotations by ENR Field Reporters

HOURLY WAGE RATES—Base rate + fringe benefits

	Common Labor: Building	Common Labor: Heavy Const	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Electrical Workers	Steamfitters	Truck drivers: 1½ T	Truck drivers: under 4 cy	Truck drivers: over 4 cy
Atlanta	$1.90	$1.90	$3.90	$3.25	$3.45+7½¢	$3.60	$3.39	$3.50+10¢	$3.80+20¢	$1.90	$2.00	$2.25*B*
Baltimore	2.20+7½¢	2.20+7½¢	4.10+10¢	3.50+7½¢*f*	3.90+7½¢	3.35/4.05+10¢*A*	3.80+10½¢	3.75+7½¢	3.74+9½¢	2.15+7½¢	2.15+7½¢	2.25+7½¢
Birmingham	1.85	1.95	3.95	3.15	3.50+10¢*mn*	3.18	3.27	3.65	3.58+12½¢*p*	1.90	2.10	2.35
Boston	2.65+10¢	2.55+10¢	3.80+20¢	3.55+10¢	4.02+20¢	4.05+20¢	3.65+45¢	3.90+25¢	3.95+27¢*R*	2.70+8¢	2.70+8¢	2.70+8¢
Chicago	3.02½+7½¢	3.02½+7½¢	4.07½+7½¢	3.75+20¢*o*	4.15+16¢*n*	3.75+5¢	3.95+23¢	4.10	3.95+24¢	2.55+175¢*R*	.....	.....
Cincinnati	2.75	2.65	3.90+10¢	3.75*D*	3.80+10¢	3.475/3.70*A*	3.725+.04	3.97+39½	3.95+9½¢	2.55+62½¢	2.60+6½¢	2.65+6½¢
Cleveland	3.25*b*	3.165*b*	3.965+10¢*b*	3.99*b*	3.89+10¢*b*	3.99*b*	3.99*a*	4.05*b*	3.79+20¢*b*	2.82+15¢*a*	2.82+15¢*a*	2.82+15¢*a*
Dallas	1.80	1.80	4.00	3.35*b*	3.425+7½¢	3.50*B*	3.75+13¢	3.50+7½¢	3.575+8½¢	1.80/2.625	1.80/2.625	1.80/2.625
Denver	2.32	2.32	3.90	3.50	3.41+7½¢	3.15	3.625+12¢	3.75+14¢	3.80+10¢	2.40*B*	2.75*B*	2.90*B*
Detroit	2.80+42¢	2.80+42¢	3.90+30¢	3.55+42¢	3.90+22½¢	3.55+36¢	3.60+34¢	3.90+47	3.835+17½¢	2.95	2.95	2.95
Kansas City	2.455	2.505	3.95	3.80	3.55	3.445	3.75	3.75+355¢	3.80+9½¢	2.43	2.43	2.505
Los Angeles	2.88+10¢	2.88+10¢	4.00+25¢	3.60+20¢	4.07½+23½¢	3.61+15¢	4.125+42½¢	4.40+44	4.10+52¢	3.15½+10¢	3.15½+10¢	3.345+10¢
Minneapolis	2.70	2.70	3.875	3.45	3.62	3.45	3.50+33¢	3.55+39¢	3.62+20¢	2.70	2.70*d*	2.85
New Orleans	1.85¢	1.85¢	3.67+7½¢*d*	3.20*d*	3.50+7½¢*d*	3.325+7½¢*d*	3.19+5¢*jk*	3.77+7½¢	3.60+17½¢*dl*	3.32+7½¢*d*	3.32+7½¢*d*	3.32+7½¢*d*
New York	3.30+26¢*c*	3.30+26¢*c*	4.80+44¢	4.40+35¢*k*	4.60+47¢*j*	4.65+37¢	4.50+62¢	4.45+1.424	4.50+54¢	2.35+22½¢	3.40+28½¢	3.40+28½¢
Philadelphia*R*	2.50	2.40+10¢	4.10+17¢	3.785	4.30+23¢	3.935/4.215+10¢*A*	4.15+15¢	4.37½+16¢	4.10+31½¢	2.45+15	2.45+15½¢	2.45+15
Pittsburgh	2.575+20¢	2.425+20¢	4.30+20¢	3.775+20¢	4.15+20¢	3.73+20¢	3.95+20¢	4.60+34½¢	4.00+20¢	2.50+20¢	2.635+20¢	2.735+20¢
St. Louis	2.775+10¢	2.775+10¢	4.05+32½¢	3.725+10¢*c*	3.75+7½¢	3.825	3.90+07½¢	4.11+31¢	4.07½+22½¢	2.80+12½¢	2.80+12½¢	2.80+12½¢
San Francisco	2.865+10¢	2.865+10¢	4.25+42½¢	3.55+30½¢	4.075+22½¢	3.60/3.76+28¢	3.79+63¢	4.22+29¢	4.14+59¢	2.81+20¢	2.75+20	2.89+20¢
Seattle	3.15+10¢	3.15+10¢	4.15+10¢	3.38+20¢	3.59+10¢	3.59+20¢	3.72+30¢	3.80+26¢	3.81+24¢	3.15+20¢	3.15+20¢	3.35+20¢
Montreal	1.65+4¢*q*	1.65+4¢*q*	2.45+5¢*q*	2.25+5¢*q*	2.45+5¢	2.35+5¢	2.50+5¢	2.35+5¢	2.47+5¢*s*	1.65+4¢	1.65+4¢	1.65+4¢
Toronto	1.85+7¢	1.85+7¢	3.00+12¢	2.80+11¢	2.90+12¢	3.05+12¢	3.00+20¢	3.30+13¢	3.20+13¢	1.90+14½¢	1.90+14½¢	1.90+14½¢

	Tractor Operators—Incl. bulldozer: 34–49 hp	70–100 hp	100 & over	Tractor scraper 15–16 cy	Power cranes & shovels: ½ cy	¾ cy	Motor grader oper	Air comp oper	Air tool oper
Atlanta	$3.00	$3.075	$3.075	$2.925	$3.45	$3.60	$2.925	$2.85	$2.00
Baltimore	3.65+10¢	3.65+10¢	3.65+10¢	3.65+10¢	4.05+10¢	4.05+10¢	3.65+10¢	3.25+10¢	2.25+7½¢
Birmingham	3.18	3.18	3.18	3.18	3.18	3.18	3.18	2.77	2.05
Boston	3.52½+20¢	3.52½+20¢	3.52½+20¢	3.52½+20¢	3.90+20¢	3.90+20¢	3.52½+20¢	3.45+20¢	2.80+10¢
Chicago	3.50+5¢	3.65+5¢	3.70+5¢	3.70+5¢	4.10+5¢	4.10+5¢	3.70+5¢	3.55+5¢	3.70+5¢
Cincinnati	3.475+10¢	3.475+10¢	3.475+10¢	3.475+10¢	3.475+10¢	3.70+10¢	3.70+10¢	3.70+10¢	3.70+10¢
Cleveland	3.74*b*	3.74*b*	3.74*b*	3.74*b*	3.99*b*	3.99*b*	3.74*b*	3.615*b*	3.615*b*
Dallas	1.80/2.625	1.80/2.625	1.80/2.625	1.80/2.625	3.225*h*	3.225*h*	1.80/2.625	1.95	1.95
Denver	2.50	3.10	3.10	3.10	3.25	3.25	3.10	3.10	2.60
Detroit	3.55+36¢	3.55+36¢	3.55+36¢	3.55+36¢	3.55+36¢	3.55+36¢	3.55+36¢	3.275+15¢	2.93+34¢
Kansas City	2.75	3.20	3.20	3.20	3.445	3.445	3.20	3.20	2.55
Los Angeles	3.91+15¢	3.91+15¢	3.91+15¢	4.01+15¢	4.01+15¢	4.01+15¢	4.01+15¢	3.13+15¢	3.09+10¢
Minneapolis	3.08	3.30	.....	3.30	3.52	3.78	3.08	2.97	2.85
New Orleans	3.325+7½¢*d*	3.325+7½¢*d*	3.325+7½¢*d*	3.325+7½¢*d*	3.325+7½¢*d*	3.325+7½¢*d*	3.325+7½¢*d*	2.675+7½¢*d*	1.95¢
New York	4.025+32¢	4.025+32¢	4.025+32¢	4.15+33¢	4.90+39¢	4.90+39¢*k*	4.15+33¢	4.15+33¢	4.15+21¢
Philadelphia	3.52+10	3.665+10	3.665+10	3.79+10	4.215+10	4.215+10	3.765+10	3.41+10	2.35
Pittsburgh	3.565+15¢	3.565+15¢	3.565+15¢	3.565+15¢	3.765+15¢	3.765+15¢	3.765+15¢	3.275+15¢	2.435+20¢
St. Louis	3.825	3.825	3.825	3.825	3.825	3.825	3.825	3.275	3.275
San Francisco	3.79+28¢	3.79+28¢	3.79+28¢	3.92+80¢	4.08+28¢	4.08+28¢	3.98+28¢	3.29/3.66+28¢	2.955+20¢
Seattle	3.56+20¢	3.56+20¢	3.56+20¢	3.56+20¢	3.93+20¢	3.93+20¢	3.65+20¢	3.29+20¢	3.20+10¢
Montreal	1.85+4¢	2.08+5¢	2.08+5¢	2.08+5¢	2.35+5¢	2.35+5¢	2.08+5¢	1.95+4¢	1.95+4¢
Toronto	2.30+10¢	2.40+10¢	2.40+10¢	2.40+10¢	2.90+12¢	3.05+12¢	2.70+11¢	2.40+10¢	2.40+10¢

ENR Skilled Average (Bricklayers, Carpenters, Iron Workers): $3.95, ENR Common Average $2.642

Description of fringe benefits last appeared Sept. 17 1959. •A 1–2 drum.

DEFERRED WAGE INCREASES UNDER PRESENT CONTRACTS: 1960: a May 1; 10¢ b May 1; 12¢ k May 1; 8¢ l May 1; 10¢ m Jan. 1; 15¢ n Jul. 1; 5¢ o Jun. 30; 22½¢ s Apr. 1; 15¢ 1959: c Dec. 1; 10¢ d Nov. 1; 10¢ e Nov. 1; 5¢.

BUILDING BOARD & LATH AND INSULATION—DELIVERED TRUCKLOAD LOTS

	GYPSUM PLASTER BOARD tapered edge per Msq ft ½"	⅝"	GYPSUM BOARD LATH plain or perf per Msq ft ⅜" x 16" x 48"	GYPSUM SHEATHING tongue & groove per Msq ft ½" x 2' x 8'	FIBER BOARD SHEATHING asph impreg & coat per Msq ft ½" sq ed	½" T&G	FIBER BOARD INSULATION sq edge, paint per Msq ft ½"	MINERAL WOOL INSULATION loose, per 40-lb bag a	3" batts per M sf	GLASS FIBER INSULATION loose, per 40-lb bag a	3" batts per M sf	ALUMINUM FOIL 60# Kraft 1 side foil per roll of 250 s. f.	Expansible Blanket 2 layers foil per Msq ft
Atlanta	$65.00*F*	$55.00*F*	$42.50*F*	$68.00*F*	$72.00*F*	$127.00*F*	$75.00*F*	1.59*g*	$70.00*F*	$2.00	$80.00*F*	$4.77*qi*	.....
Baltimore	54.00	47.50	35.75	55.70	65.00	108.50	69.00	1.40*F*	67.50*F*	1.60*F*	47.00*F*	4.00*F*	$33.50*F*
Birmingham	68.90*H*	57.00*H*	47.77*H*	75.00*H*	67.50*H*	140.50*H*	83.50*H*	1.40	70.00	1.60	75.00	3.77*gG*	.....
Boston	60.00*mH*	50.00*mH*	35.00*mH*	55.00*mH*	65.00*H*	120.00*H*	79.00*knH*	1.40*bH*	75.00*H*	.....	75.00*H*	5.30*zHS*	53.50*qH*
Chicago	67.00	54.00	45.00	62.00	87.00	123.00	87.00	1.85	80.00	.....	63/65 *i*	5.25*j*	.....
Cincinnati	52.50*wH*	42.85*wH*	33.05*wH*	51.16*wH*	77.00*wH*	125.00*wH*	72.50*wH*	1.45*wH*	62.50*wH*	1.45*wH*	62.50*wH*	3.28*jwJ*	50.00*wJ*
Cleveland	62.00*CF*	56.50*CF*	41.50*CF*	65.00*CF*	80.00*CF*	129.00*CF*	80.00*CF*	1.40/1.55*H*	75.00*H*	.....	67.00	12.50*ioJ*	55.00*J*
Dallas	56.25	46.85	42.50	56.25	68.75	118.00	68.75	2.00	65.69	1.45	70.67	5.00*gAG*	45.00
Denver	66.50*H*	58.50*H*	45.00*H*	68.75*H*	84.00*H*	130.00*H*	84.00	1.50*b*	65.00*ub*	1.75*b*	65.00*a*	5.25	48.65
Detroit	66.00*K*	56.00*K*	42.45*K*	66.00*K*	62.50*DK*	103.50*DK*	62.50*DK*	1.30*b*	50.00	1.95*b*	80.00	.....	.....
Kansas City	72.00*H*	62.00*H*	45.00*H*	.....	75.00*H*	122.00*H*	80.00*H*	1.40*H*	75.00*H*	1.80*H*	75.00*H*	3.60*d*	53.98
Los Angeles	66.00*F*	60.50*F*	0.33*xF*	64.50*F*	75.00*F*	125.00*F*	80.00*F*	76.00*BxF*	83.00*F*	1.35*a*	64.00	4.40*g*	7.45*V*
Minneapolis	75.00*F*	65.00*F*	0.44*xL*	75.00*F*	95.00*F*	130.00*F*	78.00*F*	2.25*yF*	80.00*F*	2.10*F*	80.00*F*	4.95*F*	.....
Montreal	58.00*M*	49.30*M*	37/41.50*M*	53.00*M*	64.75*M*	.....	58.50*M*	1.50*M*	66.00*M*	1.50*M*	66.00*M*	9.00*qM*	56.00*M*
New Orleans	57.00*H*	52.00*H*	45.00*H*	60.00*H*	67.00*H*	140.00*H*	80.00*H*	2.00*L*	70.00*	.....	.....	.....	52.12*U*
New York	65.00*H*	55.00*H*	42.50*H*	66.00*H*	78.00	124.00	78.00	1.55*b*	68.50*b*	.....	.....	4.38*iH*	40.00*cH*
Philadelphia	53.00	46.00	37.50	53.50	70.00	120.00	70.00	1.35	50.00	1.40	50.00	3.85	83.50
Pittsburgh	74.00*K*	65.00*K*	40.00*K*	63.00*K*	63.00*K*	103.35*K*	58.10*K*	1.10*xK*	55.00*K*	1.10*xK*	55.00*K*	4.20*iqK*	38.50*K*
St. Louis	65.00*HO*	55.00*HO*	40.00*HO*	70.00*HO*	74.00*HO*	120.00*HO*	80.00*HO*	1.35*yHO*	85.00*HO*	2.00*PHO*	77.00*HO*	4.50*iqHO*	.....
San Francisco	60.00*F*	49.00*F*	0.36*xF*	61.00*F*	70.00*F*	111.00*F*	69.00*F*	1.75*F*	66.50*F*	1.75*F*	66.50*F*	5.10	60.00*F*
Seattle	66.80*K*	57.65*K*	51.05*K*	65.00*K*	74.50*K*	125.00*K*	73.50*K*	1.15*rK*	58.00*K*	1.90**pK*	51.00**lKh*	4.25*K*	46.50*EK*
Toronto	58.00	50.00	45.00*L*	67.50	79.00*T*	.....	88.00*T*	1.85	72.00	.....	72.00	14.75*o*	46.00

•* F.o.b. warehouse. •a Semi thick. •b 30# bag. •c 3 layers of foil: $54.50. •d 40# kraft paper, 5 Msf, 100/500 rolls. •e 20# sq ft bag, 4" thick. •f Full trailer loads. •g 80# kraft paper backing 400 rolls or over. •h LCL. •i 40#. •j 80#. •k 2-in. •l 2". •m 8 to 10 ton quantities. •n Distributor's siding. •o Per Msf roll. •p 32# bag. •q 500 sf. •r 35# bag. •t 26# bag •u Flame proof $75. •v 5000 sf quantity. •w F.o.b. city. •x Sq. yd. •y 30# bag. •z Spun rock wool. •A 650 sf. •B ton. •C F.o.b. plant, freight allowed. •D CL. •E 10 Msf. •F less 2% disc, 10th. •G ½ of 1%, 10 days. •H 2% disc, 10 days. •J 1% disc, 10 days. •K less 2% for cash. •L 5% disc, 10th mo. •M fed. tax incl. •N 1% disc, 10 days. •O add 2% sales tax. •P 50 lb. bags, •Q add 4% sales tax. •R revised. •S 45 lb. •T less 2%, 30 days. •U lots of 2606 sq. ft. •V 250 sf roll.

MEXICO CITY WAGES & PRICES

WAGES, av per hour, 8 hr day (pesos)		Mar. '60
Common labor, building (peons)		1.81
	heavy const (peons)	3.75
Skilled labor,	carpenters 1 cl	4.38
	bricklayers 1 cl	5.63
	struct. ironworkers	5.62

MATERIALS PRICES, F.o.b. City (pesos)		Mar. '60
Struct. steel shapes, fob Monterey		
	I-beams, 3 x 3 x 4"...per metric ton	2600.00
Reinf. steel, corrugated rods, per ton		
	⅜"–⅝" x 11 meters consolidada	2000.00
	¾"–1" x 11 meters	1950.00

	Mar. '60
Gravel, truckload, per cu meter	
Blue gravel	28.25
Cement, std. port. (Tolteca)...per metric ton	240.00
Lumber, 2" x 4" 1st class pine 20 ft...per M sq. ft.	2700.00
2" x 4" 2nd class pine...per M sq. ft.	2500.00

Construction costs go down when you design for...

REINFORCED CONCRETE

Photograph Courtesy of Texas Highway Department

When compared with other construction materials, the cost trend of reinforced concrete bridges, overpasses, and other highway structures is usually less!

They are lower in first cost because projects always start on time—finish on schedule. There are no expensive delays due to material shortages or necessary field changes. Materials and labor are readily available from local sources.

They are lower in aftercosts, too! Reinforced concrete structures are weather resistant—require less maintenance, and are resistant to wind, shock, and quake.

On your next project, design for reinforced concrete and compare its many cost-saving advantages.

CONCRETE REINFORCING STEEL INSTITUTE CRSI FOUNDED 1924

Concrete Reinforcing Steel Institute
38 South Dearborn Street
Chicago 3, Illinois

4-60

BETHLEHEM SLABFORM

cuts concrete forming costs by one-third

At the Cole Steel Equipment Co. warehouse in York, Pa., 87 tons of Slabform were used directly over the Bethlehem structural shapes. Architect: Buchart Associates; general contractor: I. Reindollar & Son, Inc., York.

At Cole Steel Equipment's new warehouse in York, Pa., some 87 tons of Bethlehem Slabform were welded directly to steel beams to support a 4½-in., poured-in-place slab.

By using Slabform in place of the usual forming material over steel beams, it is estimated that forming costs were cut by one-third. Here's why:

1. Slabform covered the floor area quicker, at less labor cost.

2. Slabform is a permanent form, saving the entire cost of stripping.

The fasteners used with Slabform project into the slab and effectively tie the slab to the steel beams—helping to insure composite action.

Reinforcing bar high chairs, specially designed for use with Slabform, are available.

Slabform Ideal as a Concrete Form

Bethlehem Slabform is a high-strength, formed steel sheet which is used both as a permanent steel form for poured concrete, and in roofs as the permanent supporting member for lightweight insulating concrete fills. In the latter case Slabform is always used galvanized. When used as a form only, Slabform is generally furnished black (uncoated) for reasons of economy.

Longitudinal Ribs for Strength

Bethlehem Slabform is manufactured from steel having a yield point over 90,000 psi. Longitudinal ribs give it exceptional strength.

Three Weights and Patterns

Slabform is available in three weights and patterns —Standard, Heavy-Duty and Extra Heavy-Duty—to satisfy the requirements of various spans and loads.

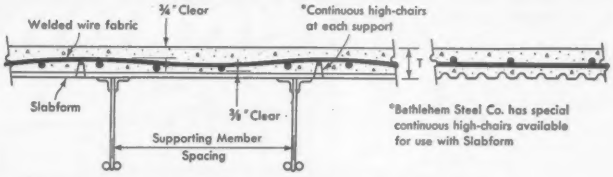
All three weights are available in black (uncoated) and galvanized finish.

Design load capacities, suggested specifications, and other information appear in Sweet's Architectural File. The nearest Bethlehem sales office would be glad to send you our Slabform folder, or talk with you about your job. No obligation, of course.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

The table shows the load capacities for structural reinforced concrete slabs over Slabform. It shows various depth slabs reinforced with minimum welded wire fabric as required by code. This table also shows the type of Slabform recommended as a form.

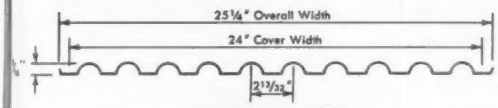


LOAD CAPACITIES OF STRUCTURAL REINFORCED CONCRETE SLABS

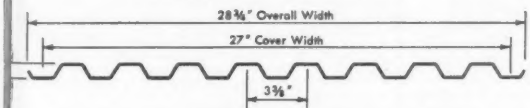
(INCLUDING REQUIRED TYPE OF SLABFORM)

Slab Thickness (Inches)	Slab Weight (Lb/Ft²)	Slab Reinf. (Welded Wire Fabric)	LOADS IN LB PER SQ FT FOR SPANS SHOWN											
			1'-6	2'-0	2'-6	3'-0	3'-6	4'-0	4'-6	5'-0	5'-6	6'-0	6'-6	7'-0
2½	27	6 x 6—10/10	366	194	114									
2½	27	6 x 6—6/6				169	117	83						
3	32	6 x 6—10/10		279	167									
3	32	6 x 6—5/5				287	181	131						
3½	36	6 x 6—4/4					300	221	167	128	85	66	51	39
4	42	6 x 6—4/4						277	209	146	113	88	68	53
4½	48	4 x 4—6/6							279	199	156	123	98	78
5	52	4 x 4—4/4								348	278	225	185	
TYPE OF SLABFORM			STANDARD			HEAVY-DUTY				EXTRA HEAVY-DUTY				

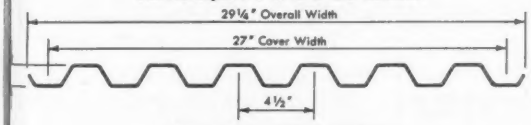
NOTES:
1. Above table gives superimposed loads which various depth slabs will carry when reinforced as shown. The type of black (uncoated) Slabform to be used is also shown. When galvanized material is used add the slab weight to capacities shown to determine allowable superimposed loads. This is based on the galvanized material carrying the dead weight of the concrete. Loads shown are for interior spans only.
2. The recommended Slabform shown in each instance will not deflect more than 1/240 span under weight of concrete only.
3. Superimposed loads were determined as follows:
   a. Bending moment $\frac{WL^2}{12}$; fc = 2500 psi, fs (welded fabric) = 28,000 psi (50% min. yield point per ACI 306(b)).
   b. Reinforcing for 2½ in. and 3 in. slabs on spans up to 30 in. based on minimum allowable for temperature reinforcing per Steel Joist Institute "Code of Standard Practice" Section 3.7.
   c. Reinforcing for 3½ in. and deeper slabs based on minimum allowable reinforcing per ACI building code 702(e) 2.
   d. Effective slab depths determined as follows:
      Standard Slabform d = T—1.28
      Heavy-Duty Slabform d = T—1.44
      Extra Heavy-Duty Slabform d = T—1.65
   e. For end spans reduce capacities shown in table by 16%.
   f. For simple spans reduce capacities shown in table by 33%.



STANDARD SLABFORM
Standard Lengths: 6'-3", 8'-3", 10'-3" and 12'-3".



HEAVY-DUTY SLABFORM
Standard Lengths: 6'-0" to 18'-6" in 6" Increments.



EXTRA HEAVY-DUTY SLABFORM
Standard Lengths: 6'-0" to 21'-6" in 6" Increments.

NOTE: ALL DIMENSIONS NOMINAL

After installation, the appearance from below is neat and clean

BETHLEHEM STEEL

Construction Reports

Bids Asked—Low Bidders—Contracts Awarded—

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 36, N. Y., ELSIE EAVES, Manager J. A. MAHONEY, M. WETZEL, M. E. SCIORRA, MARIE MORAVSIK, ELAINE CHOMYAK, ELIZABETH WERRA, ELEANOR QUERET, Reports, J. H. WEBBER, E. R. HUBER, Statistics.

NEW ENGLAND

BUILDINGS—BA

▲ **N. H., Hanover**—DORMITORIES—BA 4/12—Trustees Dartmouth College, 3 dormitories, Wigwam Circle, $1,700,000. Campbell & Aldrich, 37 Newbury St., Boston, Mass., archts. CD 6/5/58.

▲ **Mass., Weston**—SCHOOL—BA 4/14—Town, School St., high school, Wellesley St. and South Ave. $2,-200,000. Plans deposit $100. Alderman & MacNeish, 594 Riverdale Rd., West Springfield, archts. CD 11/26/58.

HEAVY CONSTRUCTION—LB & CA

▲ **VERMONT**—State Dpt. Hys., State House, Montpelier, **Lane Constr. Corp.**, 965 E. Main St., Meriden, Conn., CA **$3,870,888**, est. $4,000,000, highway work and 2 bridges, Interstate Rd. No. 89, I-89-2(7), Contr. No. 2, Waterbury and Bolton. Bids Mar. 11. CD 3/15, under LB.

BUILDINGS—LB & CA

▲ **Amston Lake Co.**, Amston, Conn. Owner Builds, **$1,640,000**, 164 HOUSES, North Pond Rd., AMSTON, CONN. CD 4/9/59.

▲ **Garry Building Corp.**, Crossroads Plaza, West Hartford, Conn., CA **$2,050,000**, 205 HOUSES "Millwood", Brushy Plains Rd., BRANFORD, CONN. Branford Development Corp., Brushy Plains Rd., Branford, Conn.

▲ **Monaco Constr. Co.**, 104 Reservoir Ave., Bridgeport, Conn., CA **$1,810,800**, Mathewson, Orchard Hills and Live Oaks Elementary SCHOOLS, MILFORD, CONN. Town, Town Hall, Milford, Conn. Bids Feb. 18, awarded Mar. 18. CD 2/25, under LB.

MIDDLE ATLANTIC

BUILDINGS—BA

▲ **Pa., Phila.**—POLICE ADMINISTRATION—BA 4/4—Dpt. Procurement, City Hall Annex, Bid 4299 general constr.; Bid 4300 plumbing, Bid 4301 air conditioning, heating and ventilating work. Bid 4302 electrical work police administration bldg; 7 and 8 Sts., Race to Cherry Sts. Extended date. CD 2/16.

▲ **N. Y., Buffalo**—PARKING RAMP—BA 4/14—P. Wks. Comn., 502 City Hall, general contract, plumbing, electric, heating, elevators 4-level parking ramp, Huron St. $1,500,000. Plans deposit $25. CD 3/9.

▲ **N. Y., Brooklyn**—SCHOOL—BA 4/21—Supt. Design, Constr. & Physical Plant, Bureau Constr., 4th Fl., 42-15 Crescent St., Long Island City 1, general contract, plumbing and drainage incl. heavy kitchen equip., heating and ventilating, electrical work and lighting fixtures for Public School 243, Troy Ave. between Dean and Bergen Sts., Brooklyn Boro. Plans deposit $30 general, $10 each mechanical trades. CD 10/12.

▲ **N. Y., Cohoes**—HOUSES—BA 4/21—Cohoes Housing Auth., 83 Oneida St., Cohoes Housing Proj. No. 22-1, general contract, plumbing gas fitting and kindred work, heating work, electrical work, lawns and planting, (a) ten 2 story row houses, 50 dwelling units, management bldg., wood frame constr. with brickveneer exterior, Polo Grounds Site (b) twelve 2 story bldgs. and management bldg. and other work as described in (a), Saratoga Street Site; (c) work of both sites will be awarded by single lump sum bid which will incl. both sites. Plans deposit $75. CD 12/3/56.

▲ **Pa., Phila.**—LIBRARY—BA 5/4—General State Auth., 18th and Herr Sts., Harrisburg, under-graduate library, seminar and classroom bldg. University of Pennsylvania, $3,200,000. Plans deposit $100. Harbeson, Hough Livingston & Larson, Architects Bldgs., Phila., archts. A. F. Jones, c/o owner, ch engr. CD 10/14/46, under Commercial Buildings.

HEAVY CONSTRUCTION—LB & CA

▲† **J. A. Jones Constr. Co.**, P.O. Box 966, Charlotte, N. C., U.S.A., CA **$2,731,000**, 1,008 enlisted men's barracks, U. S. Naval Station, NBy-26798, Spec. 26798/59, ARGENTIA, NEWFOUNDLAND. Area P. Wks. Office, New York, Rm. 633, Federal Office Bldg., 90 Church St., New York 7, N. Y. Bids Mar. 1. CD 3/9, under LB.

▲ **NEW YORK**—State Dpt. P. Wks., State Office Bldg., Albany,

N. Y.—Slattery Contg. Co., Inc. & Slattery Tunnel Corp., 46-36 54th Rd., Maspeth 78, N. Y., CA **$10,309,403**, est. $12,667,000, c. conc. roadway on viaduct 0.82 mi. misc. work 0.02 mi., streets and ramps 14.2 mi., c. conc. pavt. ramps 0.06 mi. steel elevated (viaduct) struct. Int. Rte. connection 513 (Gowanus Expressway (36th St. to 53rd St.) Int. Tour Rte. 278. FIGE 60-1, Proj. I-U-278-1 (46) Kings Co.;

N. Y.—Johnson, Drake & Piper, Inc., 36 Trinity Pl., New York 6, N. Y., CA **$3,296,493**, est. $3,313,000 9 in. c. conc. pavt. variable width 0.09 mi. misc. work highbridge interchange ramps 3 hy. Seps. plate girders, rehabilitating struc. No. 20 plate girder, misc. work on Alexander Hamilton Bridge, Int. Rte. connection 511 Contr. 3, Cross Bronx Expressway (Highbridge Interchange) Rt. 95, FICBE 60-1, Proj. 95-1(36) New York Co. CD 2/5, under LB.

▲ **NEW YORK**—State Dpt. P. Wks., State Office Bldg., Albany,

Berlanti Constr. Co., Inc., 15 Oakland Ave., Harrison, N. Y., CA **$4,036,033**, est. $4,876,000, 9 in. c. conc. pavt. variable width 0.094 mi., b. conc. Type 1A and Type 2A on interchange, 4 hy. seps. 2 RR seps. thru plate girder, Int. Rte. Comn. 580, Rochester City-Eastern Expressway, Part 1, East City line Interchange and City of Rochester: Outer Loop Arterial Hy. (Hyland Ave. to Int. Rte. 580) Int. Tour Rte. 490; FIC 60-6 FAC 60-9, Proj. I-1107 (11), U-1903 (4), Monroe Co. Bids Feb. 18. CD 2/19, under LB.

▲ **PENNSYLVANIA**—State Hy. Dpt., 506 North Office Bldg., Harrisburg,

Booth & Flinn Co., 1942 Forbes Ave., Pittsburgh, Pa., CA **$3,491,270**, 14,709 ft. divided highway, rein.-con., 36 in. wide each side medial area, 4 pairs alternate bridges, Section of Delaware Expressway (Interstate) Proj. 824-1, Bensalem and Bristol Twps., Buck Co. Bids 2/19. CD 2/24, under LB.

▲ **J. S. Constr. Co.**, Wrightstown Rd., Columbus, N. J., CA **$1,906,881**, pumping stations, force mains, interceptering sewers and sewerage system Contract 1, sewers; Contract No. 2, pumping station, Muhlenberg Twp., READING, PA. Muhlenburg Twp. Auth., 2840 Kutztown Rd., Hyde Park, Reading, Pa. Bids Dec. 16. CD 12/24, under LB.

▲ **MARYLAND**—State Rds. Comn., 300 W. Preston St., Baltimore, Zone 3,

C. J. Langenfelder & Son, Inc., 827 Pulaski Hy., Baltimore, Md., CA **$1,367,603**, concrete grading, drainage, surf. expressway from Shawan Rd. to Mt. Carmel Rd. 6.708 mi., incl. Shawan and Bellfast Rd. Interchanges from near Cockeysville, B-578-5-420, Baltimore Co. Bids Feb. 9. CD 2/11, under LB.

BUILDINGS—LB & CA

▲† **Malan Constr. Co.**, 2 Park Ave., New York 16, N. Y., CA **$2,690,000**, 1 and 2 story PHYSICS BLDG., Brookhaven National Laboratory, BROOKHAVEN, N. Y. U. S. Atomic Energy Comn., Brookhaven Area, Engineering & Constr. Branch, Bldg. 464, 53 BeH Ave., Brookhaven National Laboratory, Upton 1, N. Y. Bids Jan. 26. CD 2/3, under LB.

▲ **Warwick Constr. Co.**, Warwick, N. Y., LB **$1,319,984** (8 bidders), brick-facade HOSPITAL addn., CORNWALL, N. Y. Cornwall Hospital, Laurel Ave., Cornwall, N. Y. Bids Mar. 16. CD 3/10.

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $53,000; other public works $88,000; Industrial buildings $110,000; other buildings $400,000. Also Foreign projects of $1,000,000 and more in size of Interest to American contractors.

By Regions & Classes of Construction

(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED
New England
Middle Atlantic
South
Middle West
West of Mississippi
Far West

PROPOSED WORK
Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Public Buildings
Mass Housing
Commercial Buildings
Industrial Buildings
Unclassified

In These Stages

PROPOSED WORK: Before and including appointment of engineers or architects.
BIDS ASKED: BA (new announcements only). For full calendar, see also preceding issues.
SOON LETS CONTRACT: SLC
LOW BIDDERS: LB On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.
CONTRACTS AWARDED: CA Except awards to low bidders previously reported in low bidder stage.

CD dates shown are of Construction Daily Issue in which last previous report was published.
OWNERS, ENGINEERS, ARCHITECTS, CONTRACTORS are invited to report their new jobs for listing in these reports when they meet or exceed the size minimums shown above. Address these news releases to J. A. Mahoney, REPORTS, ENGINEERING NEWS-RECORD, 330 W. 42 St., New York 36, N. Y.

Symbols and Abbreviations Include:

† Federal Government
▲ Project of $1,000,000 or over.
ENR Engineering News-Record
CD Construction Daily
For additional reports see Construction Daily.

▲ **Wilaka Constr. Co., Inc.**, 11 E. 44th St., New York 17, N. Y., LB **$1,491,000**, (10 bidders), Proj. NYS-94, AUDUBON HOUSES, W. 154th St., W. 155th St. and Amsterdam Ave., Manhattan Boro, NEW YORK, N. Y. New York City Housing Auth., 299 Broadway, New York 7, N. Y. Bids Mar. 22. CD 2/18.

▲ **Depot Constr. Corp.**, 42-15 Crescent St., Long Island City, N. Y., CA **$3,573,000**, general contract HUMANITIES CHEMISTRY, SERVICE and HEATING PLANT BLDGS., State University College on Long Island, STONY BROOK, N. Y. Dpt. P. Wks., State Office Bldg., Albany, N. Y. Bids Mar. 2. Grand total $5,183,000. CD 3/9, under LB;
Heating Maintenance Corp., 220 E. 138th St., New York 51, N. Y., CA **$881,000**, heating for Humanities, Chemistry, Service and Heating Plant Bldgs., State University College on Long Island (Stony Brook, N. Y.);
Bana Elec. Corp., 45 Gazza Blvd., Farmingdale, N. Y., CA **$729,000**, electrical work for Humanities, Chemistry, Service and Heating Plant Bldgs., State University College on Long Island (Stony Brook, N. Y.).

▲ **Apartment Corp. of America**, 1045 Cooper St., Woodbury, N. J., Separate Contracts, **$2,000,000** 160-unit 20 APARTMENTS and SHOPPING CENTER, WOODBURY, N. J. S. Zel Bender, 225 N. 6 St., Camden, N. J., archt.-engr.

▲ **Winco Constr. Co.**, Box 889, Syracuse 1, N. Y., CA **$1,607,740**, general contract MEN'S DORMITORY, SYRACUSE, N. Y. Syracuse University, University Pl., Syracuse, N. Y. Bids Feb. 11. CD 2/9.

▲ **Glenwal, Inc.**, P.O. Box 127, Rochelle Park, N. J., CA **$1,565,700**, est. $2,900,000, HIGH SCHOOL, MONTCLAIR, N. J. Town, Town Hall, Montclair, N. J. Bids Jan. 12. CD 1/19, under LB.

SOUTH

BUILDINGS—BA

▲† **Ala., Anniston**—AMMO STORAGE AUXILIARY FACILITIES—BA 4/21—U. S. Eng., P. O. Box 1169, Mobile, ammo storage auxiliary facilities, Anniston Ordnance Depot, IFB ENG-01-076-60-49B. $2,000,-000. Plans deposit $4.50. CD 1/29/53.

HEAVY CONSTRUCTION—LB & CA

▲ **SOUTH CAROLINA**—State Hy. Dpt., Hotel Columbia, Columbia, Bids opened 3/15.

S. C.—Dickerson, Inc., Monroe, N. C., LB **$116,663** (10 bidders) resurf. hot laid b. conc. surf. course Type 1 and 2, 25.74 mi. U. S. Rte. 15, 76, 378 and State Rte. 441 S. C. Dockets Nos. 31.1015 and 43.1029 Lee and Sumter Counties, LB **$93,658**, (8 bidders), resurf. hot laid b. conc. surf. course Type 2. 30.64 mi. State Rtes. 34.97 and Rd. 81 S. C. Docket No. 28.1024 Kershaw Co.; LB **$101,009** (3 biders) resurf. hot laid b. conc. surf. course type 2. 18.32 mi. S. C. Docket Nos. 23.1082 and 39.1068 State Rte. 8. 14, 135, 183, 250, 288 Rds. 23, 104 and 166, Greenville and Pickens Counties; LB **$1,-044,920**, (10 bidders) macadam base course b. conc. surf. 11.765 mi. S. C. Dockets Nos. 32.429, 32.429 Parts 1, 2 and 3 and 40.509 F. A. Proj. Nos. I-IN-26-2 (4) I-IN 26-3 (1) I-26-3 (6) and I-IG-IN ING-126-2 (36), Lexington and Richland Counties; LB **$391,344** (4 bidders) grading, stabilized base course, b. conc. surf. concrete curb and gutter and concrete sidewalk widening 1.925 mi. S. C. Docket No. 10.475 F. A. Proj. No. F-2582 (2) State Rte. 61, Charleston Co.;

S. C.—Blythe Brothers Co., 2911 Hutchinson Ave., Charlotte, N. C., LB **$2,652,965**, (9 bidders), b. conc. surf. 16.417 mi. S. C. Dockets Nos. 23.405.1, 23,459 Parts 1 and 2 and 42.521 F. A. Projects Nos. IN-175-2 (15) I-85-2 (5) Parts 1 and 2 and I-85-2 (9) Interstate Rte. 185 and 85, Greenville and Spartanburg Counties. CD 3/8.

▲† **F. D. Rich Co., Inc.**, 550 Summer St., Stamford, Conn., CA **$2,020,438**, field maintenance hangar with parachute and dinghy shop, Tyndall Air Force Base, ENG-01-076-60-33, PANAMA CITY, FLA. U. S. Eng., 2301 Grand St., Mobile, Ala. Bids Mar. 9, CD 3/1.

▲ **Farnsworth & Chambers Co., Inc.**, 3601 Brock St., Houston, Tex., LB **$2,231,000**, general contract coliseum, State Fair Grounds, JACKSON, MISS. State Bldg. Comn., 1503 Woolfolk State Office Bldg., Jackson, Miss. Bids Mar. 17. CD 2/23;
South Central Heating & Plumbing Co., 2666 N. Mill St., Jackson, Miss., LB **$868,476**, mechanical, incl. heating and air conditioning coliseum (Jackson, Miss.).

▲ **LOUISIANA**—State Hy. Dpt., Rm. 426, Headquarters Administration Bldg., Baton Rouge, Bids opened 3/16,

La.—**L. H. Bossier, Inc.**, Box 1870, Alexandria, La., LB **$1,081,578**, (2 bidders), grade, bridges and overpass 5.045 mi. U. S. 165 By-pass, SP 15-31-02, FAP F-U-F-G-417(2) Ouachita Parish; LB **$444,928**, (2 bidders), grading, drain structures 1.766 mi. Dodson-Tannehill Hy. Rte. 167, SP 23-05-11, FAP F-140(5), Winn Parish. CD 3/2.

La.—**T. L. James & Co., Inc.**, Ruston, La., LB **$660,349**, (2 bidders), aggreg. type or soil cement base course

(Continued on page 70)

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(Continued from page 68)

1: 744 mi. Sabine-Johnson Bayou Rte. 82. SP 384-01-02, FASP S-523 (2), Cameron Parish; LB $2,911,943, (2 bidders), c. conc 8.92 mi. Sunset-Opelousas-Hy. Rte. 3052. SP 424-01-01-FAP F-65(4), St. Landry Parish. CD 3/2.

BUILDINGS—LB & CA

▲ **H. L. Coble Constr. Co.,** 1705 Battle Ground Ave., Greensboro, N. C., CA **$7,000,000,** PROCESSING PLANT and STORAGE HOUSES, DANVILLE, VA. P. Lorillard Co., 200 E. 42 St., New York, N. Y. CD 1/26.

MIDDLE WEST

BUILDINGS—BA

▲ **O., Parma**—HIGH SCHOOL—BA 4/28—Bd. Educ., 5401 W. 54th St., high school. $4,500,000. Plans deposit $150. Fulton, DelaMotte, Larson & Nassau, 6014 Euclid Ave., Cleveland, Zone 3, archts. CD 11/28/58.

HEAVY CONSTRUCTION—LB & CA

▲† **Standard Dredging Corp.,** 200 E. 42nd St., New York 17, N. Y. and **Canadien Dredge & Dock Co., Ltd.,** 600 Harbour St., Toronto 1, Ont., CA **$4,369,170,** dredging in Southeast Bend Cut-Off Channel, St. Clair River, Ontario, approx. 30 mi. northeast of Detroit, Mich. CIVENG-20-064-60-36, MICHIGAN and ONTARIO. U.S. Eng., 1101 Washington Blvd., Detroit, Mich. Bids Mar. 8. CD 3/10, under LB.

MISSISSIPPI TO ROCKIES

HEAVY CONSTRUCTION—BA

▲† **Okla., Altus**—MISSILE LAUNCHING SITES—BA—4/26—U.S. Eng., Box 61, Tulsa, nine operational missile bases, Altus Air Force Base, ENG-34-066-60-32, $10,000,000. CD 3/16.

BUILDINGS—BA

▲† **N. D., Grand Forks**—HOUSING—BA About 4/28—Base Procurement Office, Grand Forks Air Force Base, 366 family housing units, Grand Forks Air Force Base, IFN 32-605-60-448. Plans deposit $200. CD 1/12.

▲ **Tex., Sweeny** — ETHYLENE PLANT — Bids Asked — Phillips Chemical Co., Subsidiary of Phillips Petroleum Co., Adams Terminal, Houston, ethylene plant, $4,000,000. CD 7/10/59.

HEAVY CONSTRUCTION—LB & CA

▲† **S. E. Evans Constr. Co.,** 2914 North "O" St., Fort Smith, Ark., CA **$5,095,880,** (32 bidders), relocating US Hy. 69 and Katy R. R., Eufaula Reservoir, ENG-34-066-60-54, OKLAHOMA. U. S. Eng., Box 61, Tulsa, Okla. Grand total $9,422,378. Bids Feb. 4, CD 2/12, under LB;
R. G. Aldridge, 1610 Nebraska St., Kansas City, Kan., CA **$3,257,615,** railroad relocating 5.71 mi., 2-lane roadway 2.47 mi., 4-lane expressway 1.73 mi. Eufaula Reservoir, ENG-34-066-60-54, (Oklahoma);
Durard Pyle Constr. Co., 3409 Classen St., Oklahoma City, Okla., CA **$1,068,883,** roadway and railway grading 3.01 mi., Eufaula Reservoir, ENG-34-066-60-54 (Oklahoma). **H. B. Zachery Co.,** W. Harding Blvd., San Antonio, **Tex.,** permitted to withdraw LB $6,714,902 for entire project because of bid error.

▲† **H. B. Zachry Co.,** W. Harding Blvd., San Antonio, Tex. LB. **$11,836,428** (22 bidders), construction of Twin Buttes Dam, San Angelo project, DC-5274, TEXAS. Bureau Reclamation, Dpt. Interior, San Angelo, Tex. Bids Mar. 17. CD 1/25.

▲ **H. B. Zachry Co., Constr. Div.,** P.O. Box 10188, San Antonio, Tex., and **O. R. Burden Constr. Corp.,** 6702 E. 21 St., Tulsa, Okla., CA Est. **$24,250,000,** 370 mi. 20- to 24-in. gas line, from vicinity Angleton, Brazoria Co., to Fort Worth, Tarrant Co. and Graham, Young Co., TEXAS. Old Ocean Fuel Co., subsidiary of Texas Electric Co., Electric Bldg., Fort Worth, Tex.

▲ **William Bros. Constr. Co.,** National Bank of Tulsa Bldg., Tulsa, Okla., CA **$45,627,000,** 1,749 mi. 6 and 10 in. pipe line for propane and butane and natural gas from southeastern New Mexico to St. Paul, Minn., and Madison, Wis., involving 2 main lines from McPherson, Kan., and one trunkline from Eunice, N. M. to McPherson, Kan.; CA **$10,949,000,** pumping stations, controls, storage and headquarters, NEW MEXICO - TEXAS - KANSAS - NEBRASKA - IOWA - MINNESOTA - WISCONSIN, Mid-America Pipeline Co., Katy Bldg., Dallas, Tex.

BUILDINGS—LB & CA

▲ **Joe Barshop-Holcombe Properties, Inc.,** c/o Joe Barshop, 1500 S. Zarzamora Ave., San Antonio, Tex., rejected bids Mar. 18, 9 story, 500 rooms "Ramada Towers" HOTEL, HOUSTON, TEX. Ramada Inns of America, Phoenix, Ariz., lessee, Est. **$5,000,000.** CD 1/8.

▲ **Manhattan Constr. Co.,** 1811 Crawford St., Houston, Tex., and **P. G. Bell Constr. Co.,** P.O. Box 13196, Houston, Tex., CA Est. **$12,500,000,** 26 story HOTEL-OFFICE, HOUSTON, TEX. Lincoln-Liberty Life Insurance Co., 1508 Milam St., Houston, Tex. CD 9/2.

FAR WEST

HEAVY CONSTRUCTION—BA

▲ **California**—BA 5/12—Oroville-Wyandotte Irrigation Dist., P.O. Box 229, Oroville, 4 earth and rockfill dams, 3 concrete dams, reconstr. dam, 17 mi. of tunnels; 11,000 ft. penstocks, 3 hydroelectric plants, 23 mi. power and Irrigation canals, access roads, Feather River Project, Butte, Plumas and Yuba Counties. $50,000,000. Plans deposit $60. Bechtel Corp., 101 California St., San Francisco, Calif., engrs. CD 5/22/59, under LB.

BUILDINGS—BA

▲ **Hawaii, Honolulu**—OFFICE, etc.—BA 4/8—Bishop National Bank, 161 S. King, 18 story, office and garage. $4,000,000. CD 11/30.

▲ **Alaska, Anchorage**—HOSPITAL—BA 4/27—State Dpt. P. Wks., Juneau, 1 to 4 story, 131,000 sq. ft. steel frame mental hospital, incl. hot water heating sys. $6,500,000. CD 1/2/59.

HEAVY CONSTRUCTION—LB & CA

▲ **Seattle Transit Com.,** Airport Way and Atlantic, Seattle, Wash., cancelled contract, monorail system for Century 21 Exposition, SEATTLE, WASH. Est. $5,000,000. CD 5/1, under CA.

BUILDINGS—LB & CA

▲† **General Investment Co.,** P. O. Box 496, Longview, Wash., LB **$5,395,000,** (2 bidders), 330 unit Capehart HOUSING, Larson Air Force Base, Inv. 60-28, MOSES LAKE, WASH. Procurement Office, Larson Air Force Base, Moses Lake, Wash. Bids Mar. 10. CD 3/1.

▲ **Contracting Engineers Co.,** 2310 W. Vernon Ave., Los Angeles, Calif., CA Est. **$10,000,000,** SHOPPING CENTER 60-acre site, FREMONT, CALIF. The Hapsmith Co., 9808 Wilshire Blvd., Beverly Hills, Calif. Robert B. Liles, 340 Pine St., San Francisco, Calif., archt.

CANADA

HEAVY CONSTRUCTION—LB & CA

▲ **The Hydro Electric Power Comn. of Ontario,** 620 University Ave., Toronto, Ont., Owner Builds, **$182,000,000,** 114,000 kw. power plant, Little Long Rapids, north of Kapuskasing; 110,000 kw. power plant, Upper Long Rapids, 132,000 kw. power plant, James Bay, Lower Plant Rapids, all along Mattagami River, between Kapuskasing and Moosonee; 450 mi. extra high voltage power line, ONTARIO.

▲ **Peter Kiewitt & Sons of Canada Ltd.,** 1587 W. 8th St., Vancouver, B. C., **A. Johnson Constr. Co. Ltd., Poole Constr. Co. Ltd.,** Hamilton & 8th Sts., Regina, Sask. CA **$8,064,175,** South Saskatchewan River Dam Project down stream portion of tunnels, South Saskatchewan River Dam, incl. excavating approx. 10,000

(Continued on page 72)

ADV 157

Longyear

WORLD WIDE SERVICES: *Contract Drilling*—Foundation testing . . . test boring by experienced drill crews with modern equipment . . . Grout hole drilling . . . *Consulting*—Air Photo Interpretation (site planning, road planning, location of aggregates) . . . Investigation and valuation of sand and gravel deposits . . . Consultation on underground storage sites.

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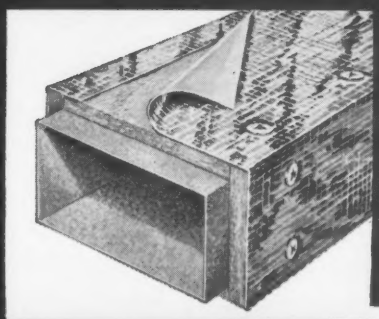
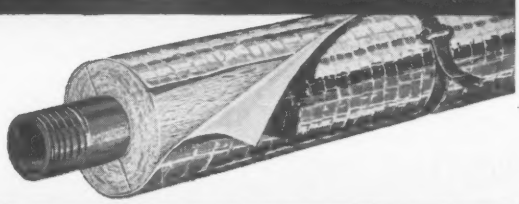
PYRO-KURE*





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Offers these superior properties:

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Pyro-Kure vapor barriers will up-grade the insulation with which they are combined. A unique manufacturing development provides *permanent* flame resistance. The adhesive used for laminating the multiple plys of kraft, foil or plastic film and the reinforcing fibers emits a gas at combustion temperature. This gas will snuff out the flame when the ignition source is removed. These products, then, are self-extinguishing.

Pyro-Kure vapor barriers are available in various combinations and standard widths. All of them provide excellent protection against condensation and at a cost equal or below similar vapor barrier material which is still not permanently flame resistant.

Pyro-Kure is now being used as insulation facing, pipe jacketing, duct lining. Leading insulation manufacturers are combining it with their products. Other applications will be developed where increased resistance to flame is of prime importance.

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*Patent Applied for.

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Chicago 6 • New York 17 • San Francisco 5
In Canada: Murray-Brantford Ltd., Montreal

reinforced paper, foil and plastics for construction, industrial packaging and agriculture

(Continued from page 70)

ft. tunnel, outside diam. in excess of 25 ft., rein.-con. lining approx. 30 in. thick, Regina, SASKATCHEWAN. Prairie Farm Rehabilitation Admin., Motherwell Bldg., Regina, Sask. Bids Feb. 24. CD 3/1, under LB.

FOREIGN

HEAVY CONSTRUCTION—LB & CA

▲ **Balfour, Beatty & Co., Ltd.,** 66 Queen St., London EC 4, England, CA Est. **$11,000,000,** vehicle tunnel from Poplar to Greenwich, East London, LONDON, ENGLAND. County Council, London, England.

▲ **Cubitts-Fitzpatrick-Shand,** 1 Queen Anne's Gate, London, S.W.I., England, CA Est. **$8,400,000,** 4-lane underpass between Piccadilly and Knightsbridge, imprv. Park Lane and East Carriageway, Hyde Park, traffic circles at Marble Arch and Hyde Park corner and 15 pedestrian underpasses, LONDON, ENGLAND. County Council, London, England.

▲ **Petrocarbon Development Ltd.,** 76 Jermyn St., London SW 1, England, CA Est. **$5,500,000,** 40,000 t/a ETHYLENE MANUFACTURING PLANT, BERLIN, EAST GERMANY. DIA Chemieausrustungen, East Berlin, Germany. Humphreys & Glasgow Ltd., Hunglas House, Carlyle Pl., London SW1, England, archts.-engrs.

▲ **Societa Impresit-Girola-Lodigiana, Milan,** Italy, CA **$30,000,000,** arch dam and underground power house, Des River, IRAN. Development & Resources Corp., 50 Broadway, New York, N. Y. U.S.A. CD 1/27/59.

AMERICANS ABROAD

HEAVY CONSTRUCTION—BA

▲ **Angola, Cela**—Bids Asked-Govt. Angola, Luanda, irrigation dam with power plant, Cuvo River Portuguese West Africa. $5,000,000-$6,000,000. Hydrotechnic Corp., 32 E. 57 St., New York, N. Y., U. S. A., engrs.

HEAVY CONSTRUCTION—LB & CA

▲ **Vinnell Corp.,** 1145 Westminister Ave., Alhambra, Calif., U. S. A., CA Est. **$6,000,000,** airport for Government of Pakistan, PAKISTAN. U. S. Eng. 346 Broadway, New York, N. Y., U. S. A.

PROPOSED PROJECTS

WATER SUPPLY

▲ **N. C., Winston-Salem**—City, City Hall, defeated bonds Mar. 1, WW imprvs., treatment plant lines, **$8,700,000.** Piatt & Davis, 111 Corcoran St. Bldg., Durham, consult. engrs. CD 2/23.

SEWERS, WASTE DISPOSAL

▲ **B. C., Vancouver**—Greater Vancouver Sewage & Drainage Dist. 2294, W. 10th St., plans by Toby & Russell, 2256 W. 12th St., sewage treatment plant, admin. power pump maintenance bldgs., preaeration and sedimentation tanks, digesters, sludge lagoons, 20,000 ft. rein.-con. effluent channel and dike, Iona Island. **$6,000,000.** Crippen Wright Engineering Ltd., 207 W. Hastings St., Vancouver, and Brown & Caldwell, 66 Mint St., San Francisco, Calif., U.S.A., consult. engrs. CD 11/19/52.

BRIDGES

▲ **Wash., Seattle**—City, County-City Bldg., Seattle, Zone 4, voted bonds Mar. 8, underwater crossing of Lake Washington ship canal as extension of Empire Expressway, **$6,982,000;** viaduct connection between freeway and Alaskan Way at Connecticut St., **$6,260,000;** extension and imprvs. W. Spokane St. viaduct, incl. interchanges, **$6,000,000;** underpass at Shilshole Ave. and W. 65 St., **$167,000.** R. W. Morse, city engr. CD 11/17.

STREETS AND ROADS

▲ **NEW YORK**—State Dpt. P. Wks., State Office Bldg., Albany,

Kings Co.—Gowanus Expressway: Contr. 2, 0.6 mi. Clinton St. to Second Ave. **$8,500,000.** To go ahead in 1960.

Gowanus Expressway: Contr. 3, 0.3 mi. Prospect Expressway interchange, Second Ave. to 20th St. **$3,500,000.** To go ahead in 1960.

Gowanus Expressway: Contr. 6, 0.5 mi. 53rd St. to 4th Ave. **$11,600,000.** To go ahead 1960.

Gowanus Expressway: Contr. 7-8, 1.7 mi. 4th Ave. to 92nd St., **$13,360,000.** Madigan-Hyland, 28-04 41st Ave., Long Island City, N. Y. To go ahead 1960.

▲ **NEW YORK**—State Dpt. P. Wks., State Office Bldg., Albany,

New York Co.—Bruckner Expressway: Contr. 3, section 1, 0.9 mi. Lafayette Ave. to Sheridan Expressway. **$14,000,000.** Howard, Needles, Tammen & Bergendoff, 99 Church St., New York 7, N. Y., engrs. To go ahead 1960.

▲ **OHIO**—State Hy. Dpt., State Depts. Bldg., Columbus, Zone 15,

Tuscarawas Co.—relocating US Rtes. 36 and 250 and State Rte. 8 around Uhrichsville and Dennison, **$9,000,000.** Capital Engineering Assocs., Dillsburg, Pa., consult. engrs. CD 3/24/58.

▲ **PENNSYLVANIA**—State Hy. Dpt., 506 North Office Bldg., Harrisburg,

Adams Co.—Gettysburg-East-West By-Pass for Rte. 30 (Lincoln Highway), **$2,500,000.**

Blair Co.—imprv. Rte. 22, between Cambria Co. Line and Frankstown, about 12 mi., **$2,500,000.**

Cambria and Indiana Counties—reconstruction Rte. 22 between Blairsville, Indiana Co. and Mundys Corner, Cambria Co., incl. Armagh By-Pass, **$6,000,000.**

Cambria Co.—reconstruction Rte. 22 between Ebensburg and Cresson about 8 mi., **$1,500,000.**

reconstruction Rte. 219 between Bens Creek and Mundys Corner, incl. Johnstown By-pass, **$7,500,000.**

Chester Co.—reconstruction 8 mi. Rte. 322 between Downingtown and West Chester, **$3,000,000.**

Lancaster Co.—reconstruction Rte. 30, Lincoln Highway, between Paradise and Chester Co. Line about 8 mi., **$3,000,000.**

Warren Co.—Warren By-pass between Warren and Youngsville, Rte. 6, **$5,000,000.**

York Co.—reconstruct about 20 mi. of Rte. 30 (Lincoln Highway), between Hallam and Thomasville, incl. York (city), By-pass east-west, **$10,000,000.** F. S. Poorman, c/o owner. engr.

▲ **PENNSYLVANIA**—Hys. Dpt., 506 North Office Bldg., Harrisburg,

Clearfield Co.—reconstruction approx. 16 mi. Rte. 322 between Grampion and DuBois. **$4,000,000.**

Lackawanna Co.—West Side bypass for City of Scranton. **$2,500,000.**

Carbondale Bypass for Rte. 6. **$2,000,000.**

Lycoming Co.—Muncy By-pass Rte. 14. **$1,000,000.**

Montgomery and Lehigh Counties—improve approx. 25 mi. Rte. 309 (Quakertown Pike), between Montgomery Co., and Coopersburg, Lehigh Co. **$10,000,000.**

Phila. Co.—Lombard-Cobbs Creek Expressway. **$60,000,000.**

Gustine Lake Interchange for Rtes. 422, 1 and 13. **$2,000,000.**

improv. Roosevelt Blvd. north of Pennypack Circle, U.S. Rte. 1. **$5,000,000.** F. S. Poorman, c/o Owner, staff engr.

▲ **Wash., Seattle**—City, County-City Bldg., Seattle, Zone 4, voted bonds Mar. 8, constr. Empire expressway from E. Union St. to Bothell Way, **$7,120,000;** street connection between Montlake dist. and the freeway at Roanoke St., **$2,357,000;** E. Mercer St. connection between Aurora Ave. and Seattle Freeway, **$1,925,000;** connection between new freeway and Aurora Ave. at N. 85 St., **$175,000.** R. W. Morse, city engr. CD 11/17.

▲ **Que., Montreal**—City, City Hall, extending, widening Burnside and Ontario Sts. from Stanley to Bleury Sts. extending Concord St. to Union Ave., **$6,000,000.** CD 8/12/55; widening Laurier Ave. between St. Denis and Resther Sts., **$585,465.**

PUBLIC BUILDINGS

▲ **Calif., Antioch**—SCHOOLS—Antioch Unif. School Dist., 20th and A Sts., bond election May 17, 2 elementary schools, 1 high school and schools addns., alterations. **$7,500,000.**

▲ **Calif., Livermore**—SCHOOL—Livermore Joint Union High School, 600 Maple St., election May 10 for **$4,000,000** State Loan, high school, S. E. Stanley Blvd.

▲ **Calif., Monterey**—JUNIOR HIGH SCHOOL, etc.—Monterey Union High School Dist., P. O. Box 1031, bonds approved $4,250,000 and State Aid authorization $8,500,000, Senior High School, two Junior High Schools and bldg. addns. and new Junior College. **$12,750,000.** CD 11/13/56.

▲ **Ill., Chicago**—CIVIC CENTER, etc.—Dpt. Purchases, City Hall, Zone 2, civic center, office, courthouse, **$67,000,000.** Skidmore, Owings & Merrill, 30 W. Monroe St., Zone 3, and Loebl, Schlossman & Bennett, 333 N. Michigan Ave., assoc. archts. Naess & Murphy, 224 S. Michigan Ave., Zone 4, supervisory archt. CD 6/11/57.

▲ **N. Y., Brooklyn**—ADOLESCENT REMAND SHELTER—Dpt. P. Wks., Municipal Bldg., New York 7, plans by Fellheimer & Wagner, 155 E. 42nd St., New York 17, N. Y., and George Sole, 347 E. 52nd St., New York 22, N. Y., Proj. C-74, adolescent remand shelter, vicinity of Atlantic Ave. and Hopkinson Ave. for Department of Correction, **$11,340,000.** To go ahead in 1964.

▲ **N. Y., Brooklyn**—DEKALB HOUSES—New York City Housing Auth., 299 Broadway, New York, Zone 7, plans by A. Gordon Lorimer, 254 W. 54th St., New York 19, N. Y., DeKalb Houses-Proj. NYS-54, 750 apartments Kosciusko St., Pulaski St., Sumner Ave. and Stuyvesant Ave. **$7,500,000.** CD 2/6.

▲ **N. Y., Brooklyn**—HOUSING—New York City Housing Auth., 299 Broadway, New York 7, Proj. NYS-100: 750 apartments, Clymer St., Wilson St., Wythe Ave. and Bedford Ave. **$7,500,000.**

▲ **N. Y., New York**—INSTITUTIONS—Dpt. P. Wks., Municipal Bldg., New York 7, plans by Kahn & Jacobs, 2 Park Ave., New York 16, N. Y., Proj. C-73, Institutions for female prisoners, North Brother Island, Bronx Boro, for Department of Correction. **$5,450,000.** To go ahead 1963.

▲ **N. Y., New York**—WORKHOUSE—Dpt. P. Wks., Municipal Bldg., Zone 7, plans by Brown & Guenther, 1860 Broadway, New York 23, N. Y., Proj. C-76, workhouse of city of New York, Rikers Island for Department of Correction, Bronx Boro. **$7,860,000.**

▲ **N. Y. Rochester**—CIVIC CENTER, PUBLIC SAFETY BLDG.—Rochester Civic Center Comn., Terminal Bldg., Broad St., plans by Faragher & Macomber, 900 Powers Bldg., Rochester, N. Y. and Voorhees Walker, Smith, Smith & Haines, 101 Park Ave., New York, N. Y., 7 story steel frame civic center; Charles H. Sells, Inc., 304 East 45th St., New York, N. Y., consult. engr. and Edward Nier, c/o owner, staff engr.;

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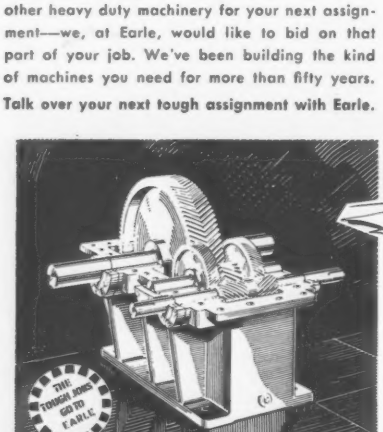

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plans by Bohacket & Flynn, 311 Alexander, Rochester, N. Y., public safety bldg. $8,000,000. CD 4/16/58.

▲ **Wis., Plymouth**—INDUSTRIAL SCHOOL FOR BOYS—State Dpt. P. Welfare, 1 W. Wilson, Madison, plans by J. & G. Daverman Co., 924 Grandville St. S.W., Grand Rapids, Mich., Industrial School for Boys. $6,000,000.

▲ **Que., Sherbrooke** — HOSPITAL — Provincial Health Dpt., Parliament Bldgs., Quebec City, plans by Pierre Rinfret, 1134 Chemin St. Louis, Sillery, mental hospital, Chemin de Stoke, $17,000,000. Audet, Tremblay & Audet, 1100 rue Prospect, superv. archts. CD 12/6/54.

COMMERCIAL BUILDINGS

▲ **Calif., San Francisco**—APARTMENTS—Albert-Lovett Corp., 305 El Cerrito Plaza, El Cerrito, plans by Hammarberg & Herman, 307 El Cerrito Plaza, El Cerrito, twin tower, multi-story, 200-250 unit Fontana Apartments, North Point St. between Van Ness and Polk St. $10,000,000. Constr. September 1960.

▲ **Fla., St. Petersburg**—HOMES—Charles K. Cheesam, 3510 4th St. N. 500 homes Ridgewood Groves. $5,500,000-$12,500,000.

▲ **Fla., St. Petersburg**—HOUSES—Florida Builders, Inc., 700 43 St., S. 1,000 houses concrete swimming pools, $10,000,000-$18,000,000.

▲ **Fla., St. Petersburg**—HOUSES—Ed Foster Builders, Inc., 435 76 Ave., 220 one family houses $4,000,000-$6,000,000.

▲ **N. J., Newark**—METROPOLITAN MEDICAL CENTER—United Hospitals of Newark, c/o Presbyterian Hospital, 27 S. 9th St., plans by Booz, Allen & Hamilton Assocs., 135 S. LaSalle. Chicago, Ill., Metropolitan Medical Center. $12,000,000. CD 6/5/57.

▲ **N. Y., New York**—HOTEL TAFT—Zeckendorf Hotels Corp., 383 Madison Ave., plans by William B. Tabler, 401 Seventh Ave., Zone 1, 15 story Taft Hotel addn., 7 Ave. and 50 St. $10,000,000. Jaros, Baum & Bolles, 415 Lexington Ave., Zone 17, consult. engrs. CD 2/25.

▲ **O., Dayton**—HOMES—Grant-Holladay Constr. Co., Commerce Bldg., 500 homes, Spinning and Kemp Rds. $8,000,000.

▲ **O., Northfield**—HOMES AND APARTMENTS—Glaser-Marotta Co., 20515 Shaker Blvd., Cleveland Zone 22, plans by Glaser & Marotta, 20515 Shaker Blvd., Cleveland, Zone 22, Northfield Square Project, 372 homes, $6,000,000, 18 apartments, $3,000,000.

▲ **Va., Richmond**—SHOPPING CENTER—Azalea Corp., 2 S. 5 St., Azalea Mall Shopping Center, near here, $5,000,000; Access Road (A) Westwood Ave. to Azalea Mall Shopping Center, $100,000; Access Road (B) to Azalea Mall Shopping Center, $100,000; Access Road (C) to Azalea Mall Shopping Center, $100,000.

▲ **Va., Richmond**—HOUSE—Seakay Corp., 7668 Horsepen Rd., 154 house subdivision River Rd. and Derbyshire Rd. (Deer Lodge Tract) near here, $6,250,000.

▲ **Ont., Toronto** — APARTMENTS — Forum Leaseholds Ltd., c/o M. Turk, 195 Montclair Ave., plans by Freedman & Petroff, 3130 Bathurst St., two 10 story, rein.-con. brick apartments, Bathurst St. $5,000,000. Alex Tobias & Assocs. Ltd., 194 Wilson Ave., consult. engrs.

▲ **Ont., Toronto**—APARTMENT—Heathmuir Investments Ltd., 1654 Bathurst St., plans by Mandel C. Sprachman, 33 Asquith Ave., four 15 story, steel frame, rein.-con., brick apartment, Walmer Rd., Heath St. W., Tweedsmuir Ave. and St. Clair Ave. W. $10,000,000. Alex Tobias & Assocs., Ltd., 194 Wilson Ave., consult. engrs.

INDUSTRIAL BUILDINGS

▲ **Calif., Long Beach** — GENERATING STATION — Southern California Edison Co., 601 W. 5th St., Los Angeles, Alamitos steam-electric generating station addn., near here. $43,300,000.

▲ **N. J., Kearny**—MERCHANDISING AND WAREHOUSE—Western Electric, 100 Central Ave., approx. 500,000 sq. ft. merchandising and warehouse, Central Ave., $5,000,000. Constr. in summer. CD 9/25.

▲ **O., Cleveland**—PLANT—Republic Steel Corp., Republic Bldg., Zone 15, plant expansion, incl. replacing coal preparation facilities, $4,100,000; modernizing benzol refining facilities, $8,900,000; modernizing, expanding billet and bar mill facilities, $11,600,000; elevated approach tracks and improving material handling for No. 2 open hearth shop, $1,500,000.

▲ **Tenn., Columbia**—FURNACE—Hooker Chemical Corp., Box 344, Niagara Falls, N. Y., third phosphorus furnace, kiln and materials handling system, $6,373,000.

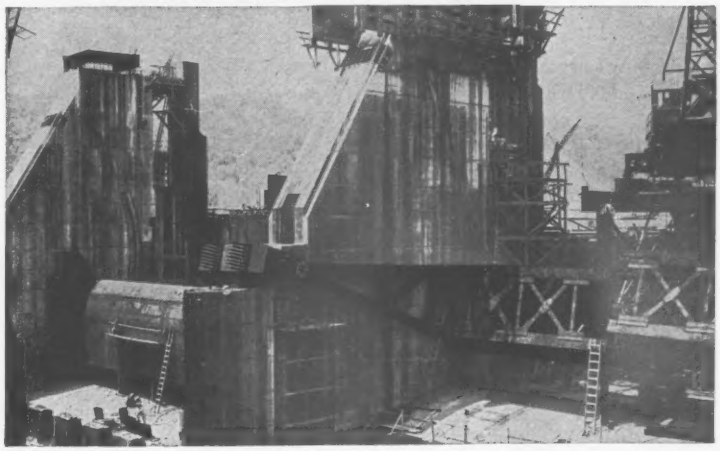
▲ **Tex., Beaumont**—ETHYLENE-GLYCOL PLANT—Houston Chemical Corp., (sub. Chatham Chemical Corp. of New York) 114 E. 40 St., New York, N. Y., ethylene-glycol plant $12,000,000; water sys. $75,000; pavement drainage, $100,000.

▲ **Tex., Galveston**—BREWERY ADDN.—Falstaff Brewing Corp., 5050 Oakland St., St. Louis, Mo., brewery addn. $5,500,000; warehouse, $250,000; water sys., $55,000. CD 8/3/56.

▲ **Tex., Hereford**—MILL—American Crystal Sugar Co., Rocky Ford, Colo., sugar beet mill, $12,000,000; site area earthwork, grading, filling, leveling, drainage, $65,000; paved mill area and auto center, $90,000; water sys. $72,000, near here.

(Proposal Advertisement see pp. 87 to 89)

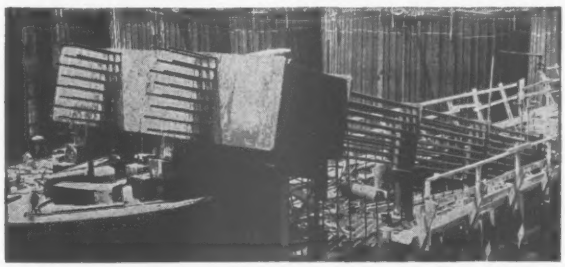
STRESSTEEL was the solution to this Engineering Problem



New Cumberland Dam, Ohio River, Corps of Engineers. Dravo Corp., General Contractors.

THE PROBLEM: Develop an anchorage for tainter gate trunnions that will result in minimum movement of the trunnions under maximum water pressures. Do this without using massive and complex combinations of reinforcing steel and large diameter tie rods.

THE SOLUTION: Anchor the trunnions to the piers by prestressing. 24 STRESSTEEL Bars, 1⅛" ∅, on each side of each gate transmit 4,800,000 lbs. compressive force to the concrete piers by post-tensioning. This force more than compensates for the maximum water pressure, anchors the trunnion securely to the pier, and at the same time maintains compression in the pier concrete.



Imaginative engineers use STRESSTEEL on many jobs to replace ordinary heavy reinforcing bars and tie rods. These high strength bars are available in sizes up to 1¼" ∅, with recommended working stress for prestressing up to 90,000 psi. Equipped with wedge or threaded anchors they offer effective solution to all special anchoring problems. You will achieve superior results at substantial savings with STRESSTEEL because it is...

- High strength alloy steel
- Easy to tension
- Low in initial cost
- Low in labor cost.

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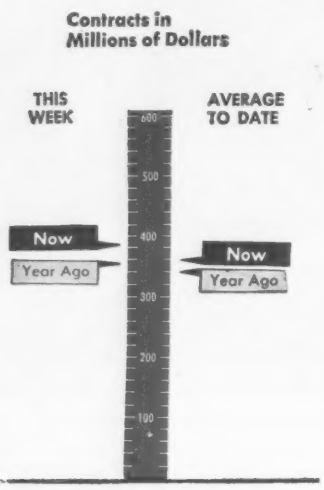
Construction Scoreboard

This Week...



AMOUNT OF CONTRACTS LET

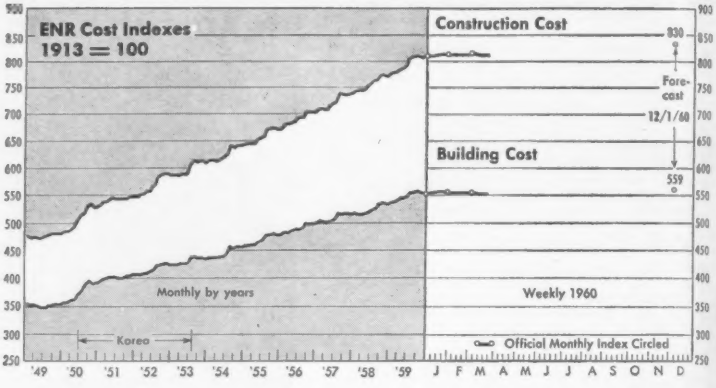
Contracts Awarded In 50 States By Type	This Week	Cum. 13 wks 1960 millions	Chge '59-'60 %
All Heavy Construction	$383.7	$4,668.7	+ 1
By Ownership			
PRIVATE	179.9	2,475.8	+ 9
PUBLIC	203.8	2,192.9	− 6
State & Municipal	164.4	1,635.5	− 2
Federal	39.4	557.4	−16
By Type of Work			
PUBLIC			
Waterworks	7.9	76.1	−32
Sewerage	12.1	136.9	− 3
Bridges*	8.0	211.6	+39
Highways	76.0	643.1	+ 3
Earthwork, Dams & Waterways	20.9	168.2	− 4
Buildings:			
Excl. Housing	49.2	510.4	−18
Housing	10.8	116.2	−15
Unclassified	18.9	331.6	−13
PRIVATE			
Buildings:			
Mass Housing	46.5	1,128.8	+21
Commercial	42.9	502.3	− 5
Industrial	29.0	558.9	−21
Unclasified	61.5	284.6	+167

*Includes Private bridges

NOTE: Minimum size projects included are: Waterworks and waterways, $53,000; other public works, $88,000; industrial buildings, $110,000; other buildings, $400,000.

New Construction Capital . . .

	Week of Mar. 24	Cum. 12 wks 1960 millions	Chge '59-'60 %
Corporate Securities	$ 36.0	$ 562.3	−27
State and Municipal:			
All Except Housing	67.2	1,629.1	+ 8
Housing	....	13.6	−51
Federal Loans	3.8	46.6	+119
Federal Aid	....	....	....
Total Nonfederal	$107.0	$2,251.6	− 3
Federal Appropriations:			
Projects in U.S.	....	....	....
Outside U.S.	....	....	....
Total New Capital	$107.0	$2,251.6	− 3



ENR INDEXES (1913=100), 20-cities' average	Week of Mar. 24 1960	% Change from Feb. 25 1960	% Change from Mar. 26 1959
Construction Cost	813.14	+0.05	+3.76
Building Cost	554.84	−0.07	+2.25

To convert above indexes to 1926 = 100: Divide Construction Cost by 2.080; Building Cost by 1.850. 1949 = 100: Divide Construction Cost by 4.770; Building Cost by 3.518.

Latest Month . . .

BACKLOG OF PROPOSED HEAVY CONSTRUCTION

	February 1960 (millions)	Percent Change from last Month	Year
Total U. S. (50 States)	$120,136	+1.2	+4.5
By Ownership—			
Private	52,483	+0.9	+5.7
State & Municipal	53,081	+1.4	+3.5
Federal	14,571	+1.2	+3.7
By Type of Work—			
Waterworks	2,882	+0.7	+5.2
Sewerage	3,867	+0.4	+6.0
Bridges	3,422	−0.5	+1.7
Highways	13,557	+4.7	+2.5
Earthwork, Dams and Waterways	12,043	−0.3	+1.1
Public Buildings	21,849	+0.6	+5.4
Industrial Buildings	17,259	+0.2	+0.2
Commercial Buildings	24,543	+1.7	+10.4
Unclassified, Private	10,682*	+1.2	+4.6
Unclassified, Public	10,033	+1.9	+3.5

* Includes Private Bridges, $95 million.

FLOW OF NEW PROJECTS INTO THE BACKLOG

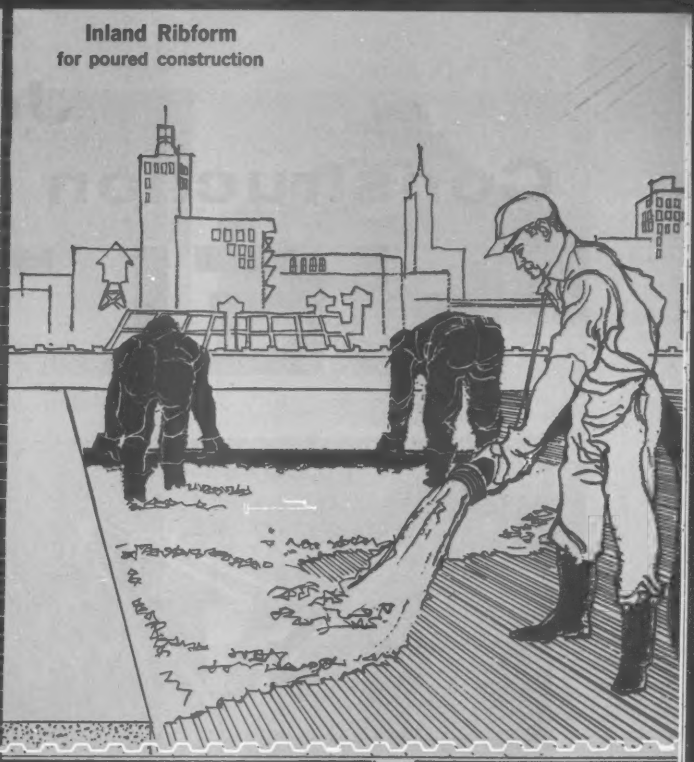
	1960 Feb. (millions)	1960 2-months (millions)	Percent Change from 1959 Feb.	2-Mos. (a)
Total U. S. (50 States)	$2,253	$3,867	+47.0	+26.5
By Ownership—				
Private	899	1,697	+ 8.8	+17.0
State & Municipal	1,086	1,812	+67.5	+25.0
Federal	268	358	+366.1	+128.3
By Type of Work—				
Waterworks	39	74	−39.4	−32.2
Sewerage	53	118	−10.6	− 3.3
Bridges	12	55	−20.9	−53.8
Highways	686	746	+240.9	+75
Earthwork, Dams and Waterways	12	46	− 4.8	−11.9
Public Buildings	294	833	− 4.0	+51.5
Industrial Buildings	248	502	−29.9	+ 7.6
Commercial: Mass Housing	294	516	+33.4	+30.1
Other Building	288	552	+60.1	+47.7
Unclassified, Private	70†	128‡	− 4.8	−40.2
Unclassified, Public	258	299	+453.3	+32.5

† Includes private bridges, $4.5 million. ‡ Includes private bridges. $5.3 million.

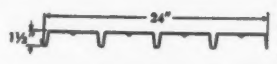
FLOW OF PROJECTS OUT OF BACKLOG INTO CONTRACTS

Total U. S. (50 States)	$573	$1,242	− 8.1	− 9.5
By Ownership—				
Private	203	472	−24.3	− 6.8
State & Municipal	279	543	+15.9	− 6.5
Federal	91	228	−20.7	−20.6

(a) Based on average week: 8 weeks in first two months of 1960; 9 weeks in first two months of 1959.

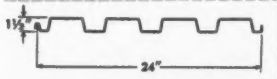


Steel deck or centering...you name it, INLAND has it!



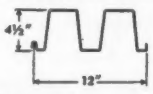
A-DECK — For purlin spacings not exceeding 8'4". Narrow ribs provide deck surface that supports the thinnest or softest types of insulation.

H-DECK — New! For simple spans to 20'0" — 3" and 4½" depths. Especially practical to cover walkways in shopping centers, schools, other installations.

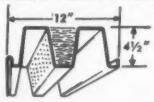


B-DECK — For spans to 10'0". Wide rib distributes metal for greater structural efficiency. Well suited for use as side wall panels.

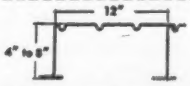
B-ACOUSTIDECK — Two-in-one panel combines steel roof deck with acoustical ceiling having Noise-Reduction Coefficient of .70. Used for spans to 10'0".



C-DECK—Carries normal roof loads over spans up to 24'0". Used extensively in canopies.



C-ACOUSTIDECK — Offers same Noise-Reduction Coefficient as B-Acoustideck. Can be used for spans to 24'0".



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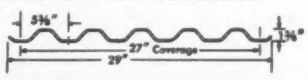

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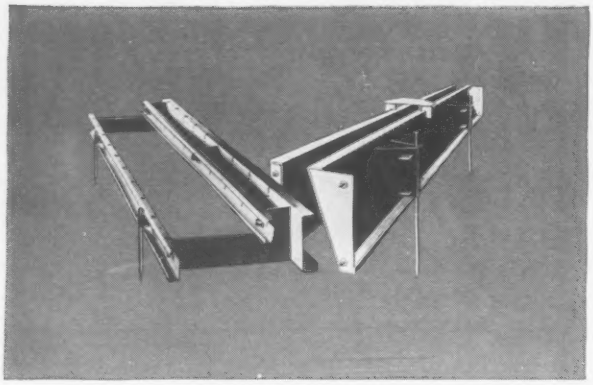
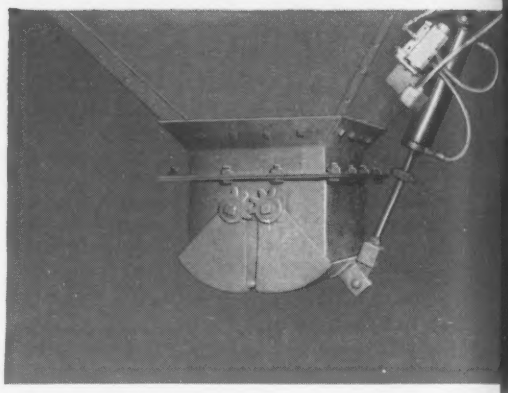
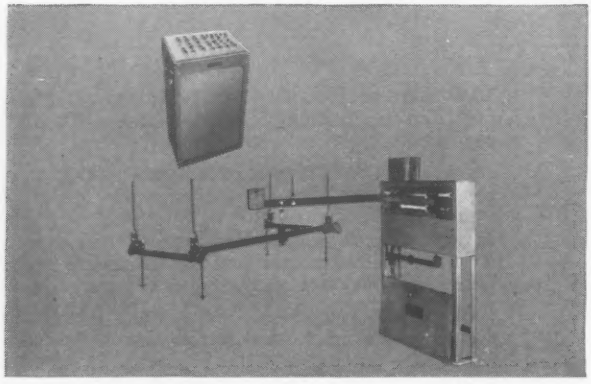


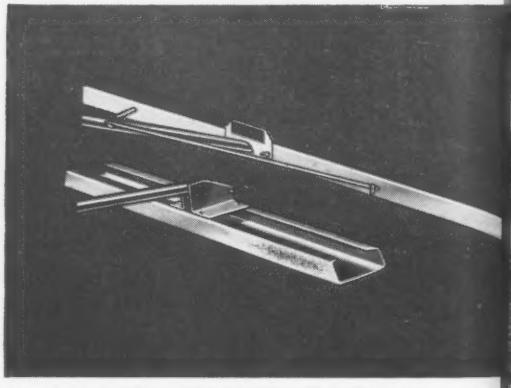
CURB, CURB AND GUTTER AND ADJACENT CURB FORMS Heltzel design provides versatility in these forms. Permits wider range of applications from a single basic set. **Request Bulletin H-563-A.**



CLAMSHELL GATES —Wide range of types to meet virtual any requirement. Pin-point control of material flow r gardless of bin capacity—type of material—discharge ra or other job requirements. **Request Bulletin H-568.**



SCALE EQUIPMENT—Sensitive, accurate weighing designed as an integral part of the batching equipment—either manual or automatic can be furnished. Scales are rugged—trouble-free. **Request Bulletin H-568.**

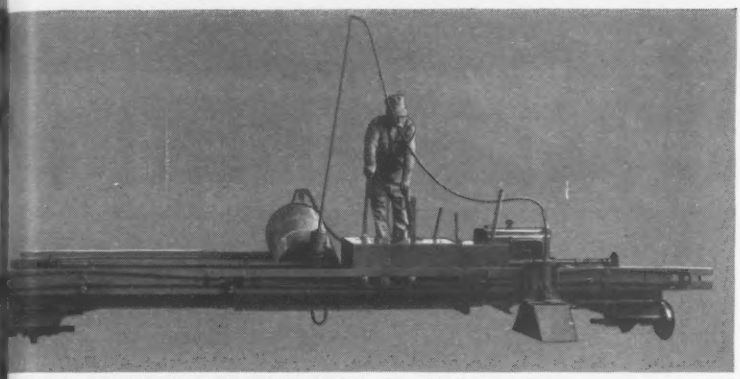


STRAIGHT EDGES AND FLOATS —Straight edges equipp with reinforcing corner braces, reversible blade and doub strength handle. Floats are steel construction with ove turned reinforcing flanges. **Request Bulletin P-22.**

Half a century of designing and manufacturing products for the construction market has given Heltzel the inherent ability to provide contractors with equipment that meets today's construction requirements for speed and quality at least cost.

It will pay you to investigate the complete Heltzel line of products. Wide in scope, it ranges from every type and size of concrete batchi plant or materials storage units—to Flex-Pla highway finishers—to forms and handtools.

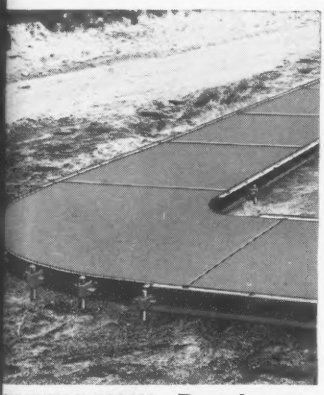
If you want the best in construction equipme engineered to today's contractor requirements- write us direct—or get in touch with your near Heltzel distributor.



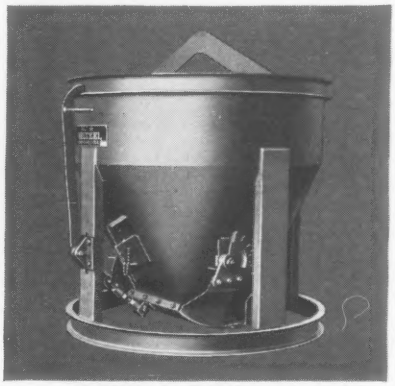
AUTOMATIC SPRAY CURING MACHINES—Provide better, faster, more economical method of membrane application. Spray carriage synchronized to machine travel—provides fool-proof overlapping coverage pattern. **Request Bulletin 59-17.** Also Sub-Grade Planers and Testers, Work Bridges. **Request Bulletins 59-15, 59-16, 59-11.**

STORAGE BINS—Your requirements for storage of any granular material can be matched exactly with a Heltzel Steel Storage Bin. Circular, square, rectangular types available. **Request Bulletin O-35.**

FLEX-PLANE CONCRETE HIGHWAY FINISHING MACHINES—Self-widening frame eliminates need for two or more finishers for paving different slab widths. Independent screed and traction drive motors provide separate and infinite speed ranges. **Request Bulletin 59-A.**



SIDEWALK FORMS—Rugged, easy to set, align and strip. Made in 10 foot sections for easy handling—slotted every 12 inches for division plates. **Request Bulletin H-563-A.**



CONCRETE BUCKETS—Heltzel offers both standard or heavy duty concrete buckets all designed with steep hopper slopes, self-cleaning gates—accurate discharge control. Handle all types of materials—empty clean.

BATCHERS: CEMENT, AGGREGATE OR COMBINATION—Designed for rapid, accurate batching—manual or automatic—constructed of finest materials and precision craftsmanship. Heltzel Batchers are preferred by contractors everywhere. **Request Bulletin H-568.**

THE HELTZEL STEEL FORM AND IRON COMPANY

WARREN, OHIO

OTHER HELTZEL PRODUCTS INCLUDE:

Highway and Airport Forms
Unitized, Portable and Stationary Concrete Proportioning Plants
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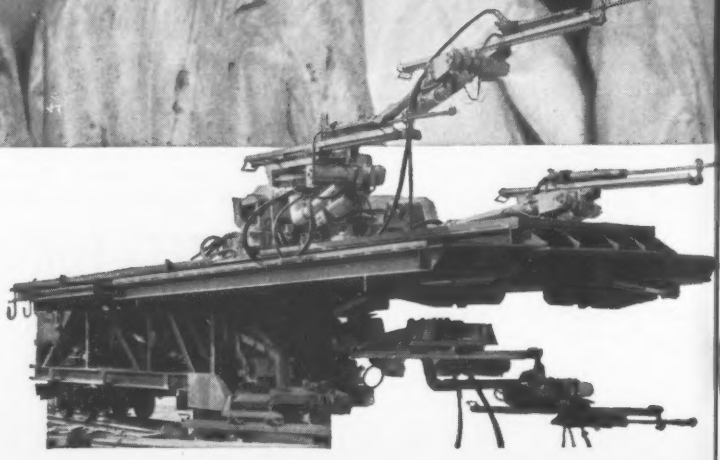
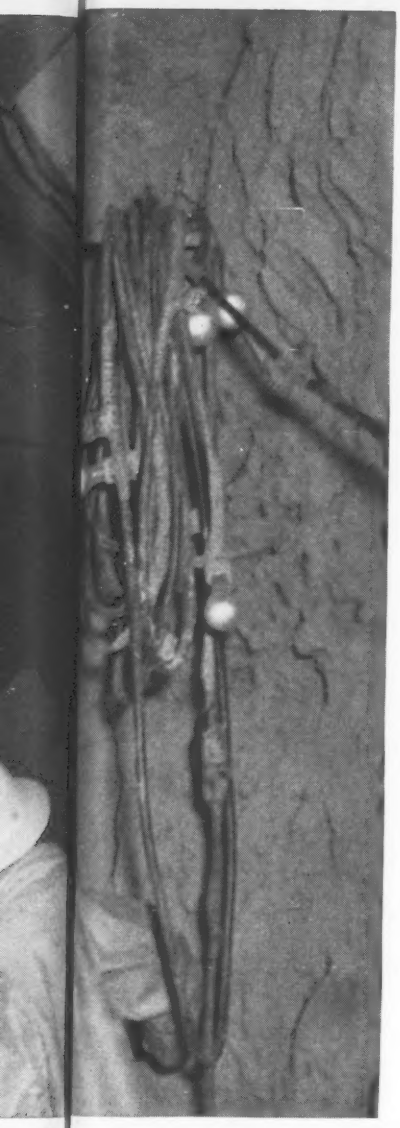
Mechanical Dowel Bar Installers
Work Bridges
Handtools
Materials Handling Systems

A GREAT ACHIEVEMENT IN EN

Holing-through on January 6



IN ENGINEERING CONSTRUCTION



A note of respect and admiration to all who had a part in driving the West Delaware Tunnel. May we add Gardner-Denver's congratulations . . .

. . . **TO NEW YORK CITY'S BOARD** of Water Supply, which conceived and directed the tremendous West Delaware project for adding 310 million gallons per day to the city's water supply.

. . . **TO THE ENGINEERS** who planned the 44-mile West Delaware Tunnel, the second longest tunnel ever driven by man.

. . . **TO THE CONTRACTORS** who developed new tunneling techniques, and drove the bore to final holing-through months ahead of schedule.

. . . **TO THE MEN** who operated equipment so diligently, and who established hard rock tunnel records.

. . . TO THESE FAMOUS NAMES:

New York City Board of Water Supply
Arthur C. Ford, President
Edward C. Maguire, Commissioner
Herbert M. Rosenberg, Commissioner
Stanley M. Dore, Chief Engineer
N. LeRoy Hammond, Deputy Chief Engineer in Charge of Construction

Drake-Grafe-Winston-Tecon-Conduit—joint venture of:
Johnson Drake & Piper, Inc.
Grafe-Callahan Construction Co.
Winston Bros. Co.
Tecon Corp.
Conduit & Foundation Corp.
Clancy O'Dell, Project Manager
Richard P. King, Chief Engineer

West Delaware Tunnel Constructors—joint venture of:
Johnson Drake & Piper, Inc.
Winston Bros. Co.
Tecon Corp.
Conduit & Foundation Corp.
Clancy O'Dell, Project Manager
Richard P. King, Chief Engineer

MacLean-Grove Brewster—joint venture of:
MacLean-Grove Co.
George M. Brewster & Son, Inc.
Mansell MacLean, Project Manager
Eugene Tufts, General Superintendent
Hugh Cronin, Chief Engineer
Arthur P. Chase, Resident Engineer

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EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

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Gardner-Denver Company, Quincy, Illinois
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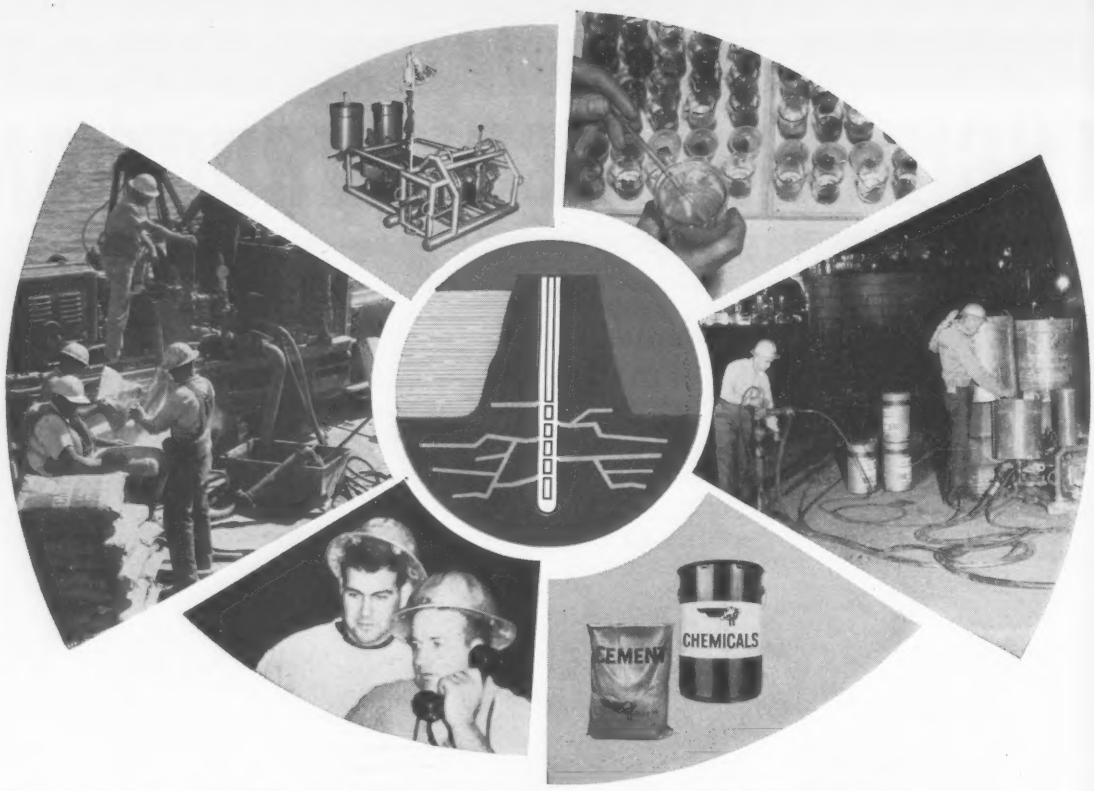


FULL SCOPE OF SERVICE

Halliburton *Full Scope* Pressure Grouting Service offers a balanced selection of the best grouting methods and materials available today. To give you the complete picture of the many benefits of this outstanding service, Halliburton has prepared a comprehensive grouting brochure which is available now on request. A few of the advantages offered by Halliburton Pressure Grouting Service, and presented in this brochure, are outlined below.

CHEMICAL GROUTING

... research designed and job proven for helping control unwanted water infiltration, seepage and leakage. Chemical grouts offered include HYDRO-LOK (PWG), HG-10 RESIN and BLOX-ALL. These low viscosity grouting agents contain an internal catalyst allowing injection as a single fluid for timed reaction. This permits the chemical grout to be injected in a single operation for closer control and more uniform setting throughout the entire permeability of the formation than with agent-plus-catalyst double injection chemical methods.

CEMENT GROUTING

... with Halliburton cements, retarders and accelerators for helping to seal large fissures and solution channels in water-bearing formations ... and special water-reactive cement grouts for use where troublesome water flows are encountered. These products – together with Halliburton research and know-how – give the greatest selectivity available for choosing the right grout – light or heavy, and the best setting characteristics – fast or slow.

PUT THESE PRODUCTS AND TECHNIQUES TO WORK FOR YOU. When soil stabilization or water control problems point to pressure grouting ... call on Halliburton ... and Compare the Results!

"275 LOCATIONS TO SERVE YOU"

HALLIBURTON

PRESSURE GROUTING SERVICE

A DIVISION OF HALLIBURTON OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA

New ENR indicator shows . . .

Lumber Prices Are Moving Down

Continued declines in fir lumber prices are forecast by a new "Lumber Demand Indicator" (see charts at right) developed by ENR and its sister publication, CONSTRUCTION DAILY.

To measure weekly fluctuations in demand, the Indicator uses net changes in the ratio of unfilled mill orders to gross fir lumber mill stocks. These data are obtained from a weekly report of the National Association of Lumber Manufacturers, which represents 142 lumber mills.

The raw data translate into plus or minus values plotted on the chart as the Indicator line. Direction of its movements forecasts changes in fir lumber prices, fob city, which react within a few weeks to shifts in demand at the mills.

This Indicator has performed well as a price forecaster since the beginning of 1959, although it has not yet been tested under all demand-supply conditions.

Some examples:

On June 6, 1959, the Indicator fell from +9.6 to −5.7. Within two weeks, ENR's 18 cities fir lumber price average declined 80 cents per Mftbm, or 0.6%. On July 11, the Indicator rose sharply from −20 to −4.5, and the following week hit +4.6. A few weeks later, fir prices averaged $2.25 higher.

The Indicator flagged in advance the severe fir price slide during the last quarter of 1959. On September 5, the Indicator line dropped into minus territory and remained there until December 5, when fir lumber prices were $5.93 per Mftbm lower.

The Indicator also predicted the sharp upswing in lumber prices, which began December 5. On that date, the Indicator jumped from −8.4 to +3.6. Within seven weeks, ENR's fir lumber average had increased by $1.17 per Mftbm.

On January 16, 1960, the Indicator fell to −3.2 and now fir lumber prices are down an average of $1.17 per Mftbm.

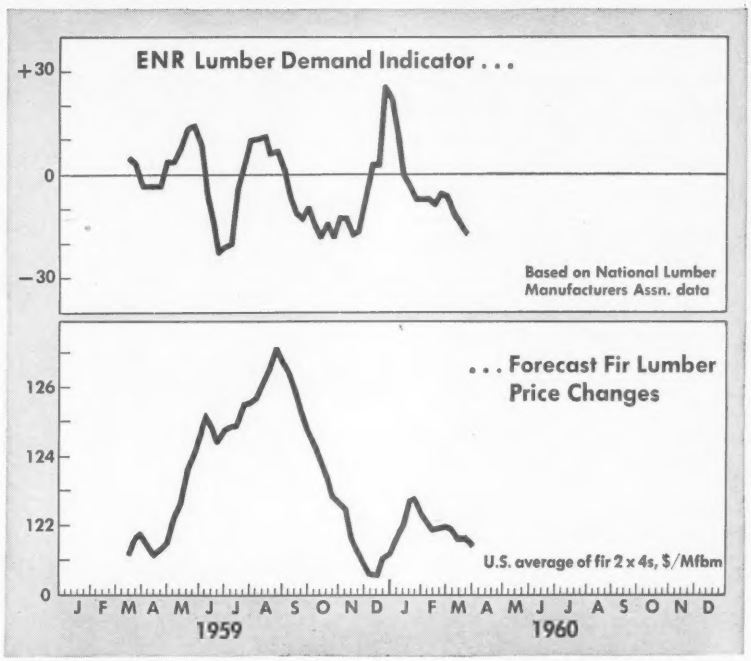
The chart shows now that the Indicator line is nosing still deeper into minus territory, revealing dwindling demand for fir lumber and mounting mill inventories. This condition should press prices down lower throughout the coming weeks.

ENR's Lumber Demand Indicator reveals coming changes in the trend of fir lumber prices far enough in advance to help contractors time their purchases more advantageously.

However, movements of the Indicator do not forecast actual future price levels precisely. Local lumber market conditions differ from one pricing center to the next, while the Indicator is based on fir lumber orders from all parts of the country.

The Indicator is therefore most useful in warning contractors when and what to look for in lumber price changes during the next month or so.

The Indicator is also a good, though less sensitive, forecaster of future changes in pine lumber prices. Mill stocks of pine are so large in relation to unfilled orders that prices do not react quickly to changes in the stocks-orders ratio. Because of competition between fir and pine lumber, however, pine prices will often move in the direction forecast for fir lumber by ENR's Indicator.


ENR Lumber Demand Indicator . . .
+30
0
−30
Based on National Lumber Manufacturers Assn. data
. . . Forecast Fir Lumber Price Changes
126
124
122
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U.S. average of fir 2 x 4s, $/Mfbm
J F M A M J J A S O N D J F M A M J J A S O N D
1959
1960

Business in Brief . . .

• **School cost study**—Gov. David L. Lawrence of Pennsylvania has ordered a special study of school construction costs in the state as part of a sweeping probe of the state's educational system.

• **Mortgage market ease**—Cost of home mortgages is expected to ease, according to the United States Savings and Loan League. The organization joins other financial authorities who are convinced that the peak in mortgage rates has been reached.

• **Local-business boost**—Olin Mathieson Chemical Corp. and Pennsalt Chemical Corp. plan a construction start in May on a $6.5-million chemical plant at Calvert City, Ky.

• **Sold**—Bay City Shovels, Inc., of Bay City, Mich., has been bought by Unit Crane & Shovel Corp. of Milwaukee. It will continue to operate under its own name in the same location as a wholly owned subsidiary of UC&S. Bay City had been up for sale often in recent years.

"WE DRILLED 300′ TO 500′ PER REGRIND . . . GOT 10 TO 12 REGRINDS PER BIT WITH TIMKEN® CARBIDE INSERT BITS"

Special report from Henry J. Kaiser Co. and Raymond International, Inc.

LOCATION: HOWARD A. HANSON DAM, ON GREEN RIVER, EAGLE GORGE, WASHINGTON

Operating conditions: basalt and sandstone

Here's another project where Timken® carbide insert bits proved their exceptional long life and fatigue resistance. In construction work at the Howard A. Hanson damsite, Henry J. Kaiser Co. and Raymond International, Inc. used 143 drills. The drilling rate was 24″ to 36″ per minute. Hole depths drilled ran up to 40′. With Timken carbide insert bits, they drilled 300′ to 500′ per regrind, got 10 to 12 regrinds per bit—made important savings in drilling costs.

Which Timken Bit should you use?

In hard, abrasive ground, use the Timken carbide insert bit for greatest economy. In softer ground, use the low-cost Timken all steel multi-use bit. Both bits are interchangeable in the same thread series; you can switch bits as the ground changes. Dozens of different Timken bits fit the same drill steel. And both types are made from Timken electric furnace fine alloy steel, have special shoulder unions to protect threads against drilling impact. Let us help you select the Timken bit best suited for your job. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

TIMKEN®

removable rock bits

Engineers Exempted From City Union

Their protests force changes in Philadelphia proposal that would unionize all city civilian personnel

It looked for a time during the last few weeks as if engineers employed by the City of Philadelphia might have to join a union against their will.

Mayor Richardson Dilworth and the Democratic majority in the City Council originally agreed to meet a union shop demand advanced by District Council 33, American Federation of State, County and Municipal Employees, AFL-CIO.

The council has exclusive bargaining rights for all the city's 20,000 civilian employees except uniformed personnel. About 11,000 city workers are members of the union.

The proposal was vigorously opposed by the Philadelphia Chapter of the Pennsylvania Society of Professional Engineers, to which some of the city employees belong. Last week an exemption was tentatively agreed upon for all engineering, city planning and architectural personnel.

Among those affected by the exemption are 445 engineers and public works technicians and 16 architects. Most of them are employed in the Water, Streets and Public Property departments.

The status of about 100 other technicians in the various city public works departments remains to be resolved.

A local survey of city engineering personnel conducted by ENR disclosed that a great majority of such personnel did not wish to join the union and would resist legally any such attempt to force them into the union against their will.

Among the questions raised was whether city employees protected by civil service could be fired if they refused to join.

Under the typical union shop clause, workers represented by the union can be required, as a condition of employment, to join the union 30 days after employment. The Philadelphia proposal as now revised includes a clause allowing new employees to resign from the union after paying dues for one year.

The union has been trying to get all city employees into its membership ever since the Democrats captured City Hall in 1952. The union contends all city employees gain benefits from contracts negotiated by the union and that all employees are therefore obligated to support the union financially. Such an argument is frequently used against right-to-work laws and as justification for the inclusion of agency shop clauses in labor contracts.

The union has now started an "educational" campaign to sell its advantages to engineering and technical personnel. It has scheduled meetings with professional engineers and technicians.

An estimated 2,000 city employees will be required to join the union under the revised union shop proposal. About 5,000 will qualify for the engineering, city planning and architectural personnel exemption. About 50 technical employees, mostly draftsmen and surveyors, are already members of the union.

There are no engineers among the technicians whose status under the proposed union shop clause is still in doubt.

Union Sued for Strike Damages

New York sheet metal workers oppose use of flexible hose and spiral ducts in heating and cooling systems

A labor dispute over the use of flexible tubing and spiral ducts in heating and air-conditioning systems is troubling New York City's construction industry. One result is a $5-million damage suit filed against Local 28 of the sheet metal workers union.

Earlier this month the union pulled its men off 29 jobs on which Triangle Sheet Metal Works, Inc., a Long Island firm, has over $12-million worth of contracts.

The work stoppage represents a union protest against Triangle's use of spiral duct and flexible metal hose. The disputed material is being used on only one of the struck jobs, but all of Triangle's job sites, as well as its shop, have been struck.

The flexible tubing and spiral ducts are used in conjunction with rigid ducts on both interior and peripheral heating and cooling systems. They can be obtained in various sizes, can be shipped direct to a warehouse or job site ready for use, and are easier to install than the rigid ducts.

Local 28's attorney says the union is trying to protect members against loss of jobs in fabricating shops. He wants the issue negotiated.

A Triangle official contends that the union is really trying to obtain the right to decide on what systems the disputed material can and cannot be used. This, he says, would be an "engineering review" of specifications.

The problem, however, is not new, although use of the disputed material in the New York area is reportedly small. Similar disputes have arisen in the past but not on the present scale.

Most significant of the legal aspects of the dispute is the fact that the current labor contract calls for the mediation or arbitration of disputes and contains a ban on strikes in the meantime.

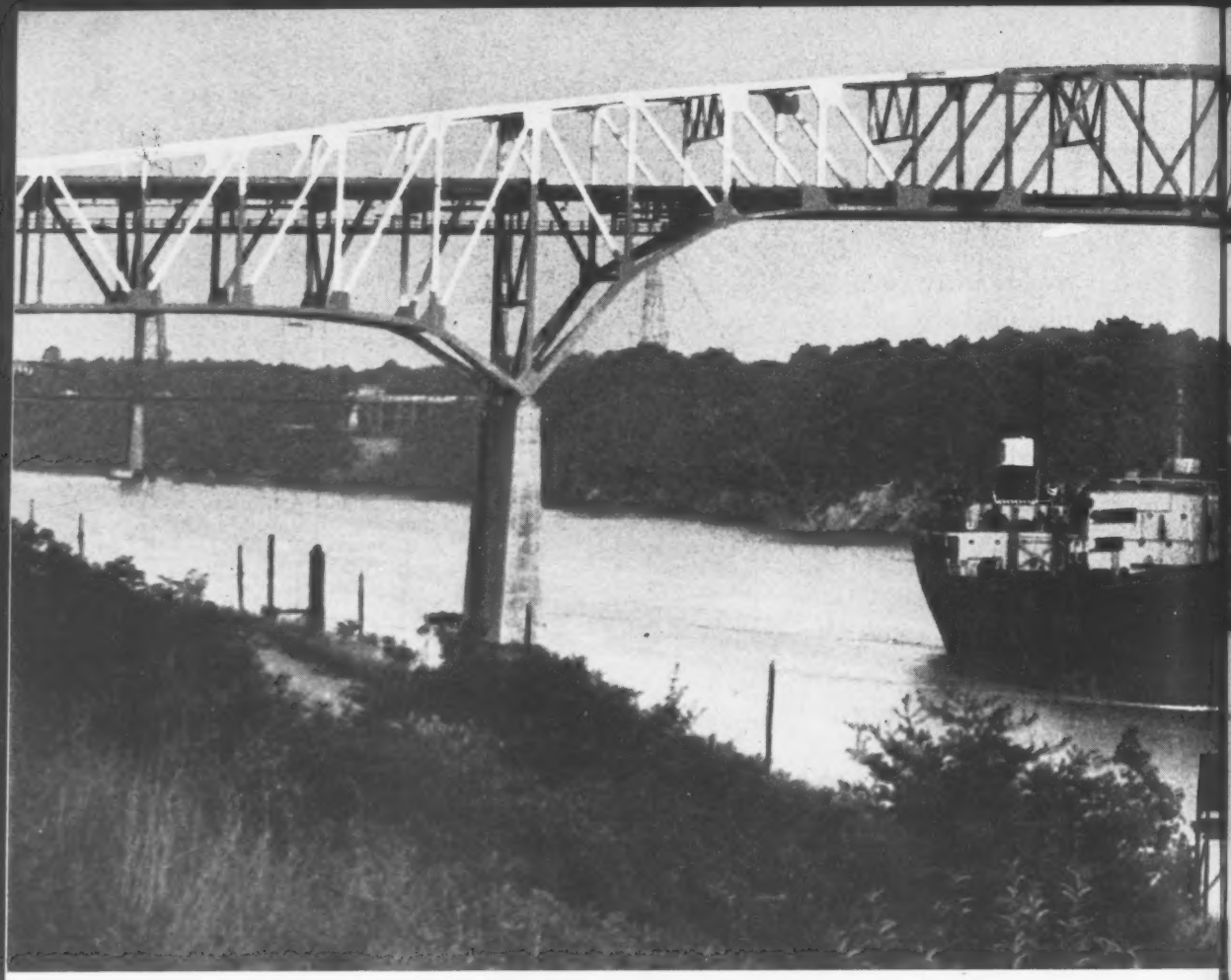
Triangle contends—and the sheet metal workers deny—that the union has breached the contract by striking instead of mediating. In doing so, the company notes, the union has jeopardized construction work that has a gross value of over $470 million by striking over the use of $17,700 worth of disputed material instead of resorting to the disputes settlement machinery provided for in the contract.

Upshot is the filing of unfair labor practice charges against the union with the National Labor Relations Board. The charges, based on the secondary boycott provisions of the Taft-Hartley Act, were filed by Triangle and by the local sheet metal and mechanical contractor associations. The contractors expect the NLRB to request an injunction against the strike.

At the same time, Triangle has filed its damage suit in federal court. The suit seeks civil damages for breach of contract and Taft-Hartley Sec. 303 damages for unlawful boycott activity.

Since the litigation was started, the international union has asked the local union to return to work—but without success. It has advised the local that it cannot condone a failure to utilize settlement machinery on which the local and contracting employers have previously agreed.

(*Labor continued p. 86*)



A new bridge for tall ships

Freigl
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Roanoke

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Freighters have no trouble clearing the new, high-level Summit Bridge over the Chesapeake and Delaware Canal. This 2,058′ cantilever bridge provides a 135′ vertical clearance over the channel, and carries a four-lane highway linking Delaware with Maryland. The new bridge replaces an old vertical-lift highway bridge that was located about a half-mile west. ☐ The structure was designed for the District Engineer, U. S. Army Engineering District, Philadelphia, by the J. E. Greiner Company, Consulting Engineers, Baltimore, Maryland. American Bridge handled fabrication and erection. Amount of steel used: 5,545 tons. ☐ The Summit Bridge has a total of nine spans, including three main spans of 300′, 600′ and 300′. Write for information on our construction services, or call our contracting office nearest you.

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American Bridge Division of United States Steel

USS

Labor in Brief . . .

• **Air base picketed**–Some $9 million worth of construction work at Hamilton Air Force Base in California was picketed last week in a labor dispute over a painting contractor's use of non-union painters. Unionists said they protested failure to meet the overtime and fringe benefit standards that applied on the job.

• **To use local labor**–Indiana's Lt. Gov. Crawford F. Parker has instructed engineers in bridge and road construction divisions to see that local workers get first chance at unskilled labor jobs on highway projects. Union laborers have complained that contractors are hiring men from Ohio, Kentucky and Tennessee.

• **What's the law about**–A 251-page analysis of the Landrum-Griffin labor law has been prepared by the Chamber of Commerce. It's called "Labor Reform Law, 1959, The Landrum-Griffin Act" and is available at the Chamber's Washington, D. C., office at $5 a copy.

• **Promotional venture**–Two locals of the bricklayers union have joined with masonry contractors, building materials firms and concrete block companies in two Ohio and three Kentucky counties in forming the Unit Masonry Association of Greater Cincinnati. The new organization will promote masonry construction.

• **Greener pastures?**–Harry Bridges' International Longshoremen's & Warehousemen's Union has negotiated a labor agreement with eight small construction firms on the Hawaiian island of Maui. Contract provides wage increases ranging from 65 to 90 cents an hour, plus fringe benefits that include paid vacations, paid holidays, sick leave and medical care.

• **Charged with boycott**–The National Labor Relations Board has ruled that the Wilmington, Del., Building Trades Council committed a secondary boycott by picketing for organizational purposes at three school construction sites. General contractor and half the subcontractors hired nonunion workers.

Contractors Hit Situs Picketing

Leaders of the building trades unions are misleading Congress and the Administration in their efforts to obtain situs picketing, says a spokesman for the Building Contractors Association of New Jersey.

The association's managing director, Paul J. Brienza, says the unions' real objective is a "red carpet" approach to organizing rather than the right of refusing to work alongside nonunion workers.

"Under present federal laws," Mr. Brienza says, "the building trades do have a right to picket when nonunion employers and employees are on the job, but what the building trades do not like is that they are required to conform to certain standards while they are picketing in order to protect innocent employers and employees working on the same construction site."

Meanwhile, the House Education and Labor Committee has killed a proposed legislative compromise on the issue by a vote of 22 to 7. Now before the committee is the Thompson bill (H.R. 9070). The bill would free a legitimate strike against one of several contractors on a job site from running afoul of current secondary boycott restrictions.

The compromise would have given statutory status to the right Mr. Brienza referred to. The right has been spelled out by the National Labor Relations Board in its decisions and is circumscribed by specific conditions to which the picketing must conform. Best known decision is the Moore Drydock case.

Unlike H. R. 9070, however, the compromise would have given situs picketing the presumption of legality rather than legality itself.

The building trades say the Moore Drydock approach is no help. NLRB General Counsel Stuart Rothman recently conceded it is "difficult" for unions to picket common sites. The House committee apparently agrees.

Mr. Brienza accused the unions of wanting the situs picketing legislation as a vehicle for unionizing workers through employers rather than through employees. He also charged that the legislation would "create untold work stoppages" by allowing unions to extend secondary boycott action to situations far beyond job site disputes. The unions deny this.

OFFICIAL PROPOSALS

Bids: April 14, 1960

The Furnishing and Delivery of Generator Hatch Cover Frames for Tuscarora Power Plant

POWER AUTHORITY OF THE STATE OF NEW YORK
NIAGARA POWER PROJECT
ADVERTISEMENT FOR PROPOSALS
SPECIFICATION NO. PA-N-23027
NIAGARA CONTRACT NO. NP-40

NOTICE TO CONTRACTORS: The Power Authority of the State of New York will receive sealed proposals for the Furnishing and Delivery thereof, F.O.B. University Siding, Tuscarora Power Plant Area, Niagara Falls, New York, for twelve (12) two-section, mobile, unit hatch cover frames for the Tuscarora Power Plant in Lewiston, Niagara County, New York, until 10:30 A.M. Eastern Standard Time on the 14th day of April, 1960, at the Authority's Office, 18th Floor, The Coliseum Tower, 10 Columbus Circle, New York 19, New York, at which time and place proposals will be publicly opened and read aloud.

Bids will be received for furnishing and delivery of twelve (12) Hatch Cover Frames complete with appurtenances for the twelve (12) Unit Generators for the Tuscarora Power Plant. The total weight of the Hatch Cover Frames is approximately 300 tons. Erection at the site of installation will be done by others. First delivery will be required June 1, 1960.

All work shall be completed on or before January 23, 1961.

Plans, Specifications and Proposal Forms for the work may be obtained from the Power Authority of the State of New York, 18th Floor, The Coliseum Tower, 10 Columbus Circle, New York 19, New York, upon application and prepayment of a fee of Ten ($10.00) Dollars, per initial set of contract documents, and Five ($5.00) Dollars per set for additional sets, no part of which will be refunded. Plans, Specifications and Proposal Forms for the work will be on file in the Authority's Office and in the offices of the Engineer, Uhl, Hall & Rich, 230 Congress Street, Boston 10, Massachusetts, and may be inspected by prospective bidders during office hours.

Bids must be made and returned in duplicate in accordance with instructions contained in the Information for Bidders. Guarantee will be required with each bid in an amount not less than 20 per cent of the gross sum bid.

The right is reserved to reject any or all bids.

W. S. CHAPIN
GENERAL MANAGER

PA-N-23027

Bids: April 19, 1960

Nashville Avenue Wharf and Approach Trestles

REVISED ADVERTISEMENT

Board of Commissioners of the Port of New Orleans will open bids at No. 2 Canal Street on Tuesday, April 19, 1960 at 2 o'clock p.m. for the Nashville Avenue Wharf and approach trestles, approximately 60,000 sq. yds. in area of concrete deck on steel bearing piles from Board's stock, grading, foundations for future shed, etc.

Plans, specifications and bid forms may be secured after March 21, 1960 at Room 214 upon deposit of $25.00 by check payable to Board, refundable up to the extent of three sets taken out by anyone submitting a bid directly to the Board. Other sets are available at $25.00 per set, not refundable.

Preliminary plans are available for inspection.

Prior to opening of bids, bidder shall submit evidence that he holds license of proper classification and in full force and effect under La. R.S. 37:2151.

Deposit of 5% of bid, by certified or cashier's check, is required with bid.

Acceptable surety bond for amount of bid is required with notarial contract.

Board may accept or reject any bids, waive informalities and award contract in its best interest.

Req. ENG 3916

March 24, 31, 1960

Bids: April 21, 1960.

New York State Road Work

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.,—Pursuant to the provisions of the Highway Law, and Article 2, Title 9 of the Public Authorities Law, and special provisions for projects financed with Federal Aid Funds, sealed proposals will be received until ten-thirty o'clock A. M., eastern standard time on the 21st day of April 1960, by Henry A. Cohen, Director, Bureau of Contracts, 12th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name	Miles	Type	Deposit	Estimated Cost of Work
DISTRICT No 1, G L Nickerson, District Engineer 353 Broadway, Abany 1 New York						
Albany	FASS 60-4 PSC 18538	Fuller Road C R 156, Elm of Grade Crossng of the NY,C. Railroad with the Fuller Road, C.R 156 Project S-568(1)	1.95	9" Cem Conc Pavt 40', 48' & Var=1 72 Miles; Asph Conc=0.23 Mi.; RRGS-NYCRR-Plate Girder Span 62.0'	$93,000 Plans $5	$1,691,000
Rensselaer & Washington (Rte. 40)	FARC 60-27	Schaghticoke-Middle Falls, Pt. 1, S H 8350 Schaghticoke-Middle Falls Pt. 2, S.H. 8350 Project F-504(11)	7.98	Asphalt Concrete	$84,000 Plans $5	$1,531,000
Rensselaer (Rte. 67)	RC. 60-43	North Hoosick White Creek Station S.H 1792	4.05	Asph. Conc.=4.03 Mi Misc. Work=0.02 Mi.	$8,000 Plans $5	154,000
Rensselaer (Rte. 7)	R.C. 60-42	Whitehouse Bridge-Vermont State Line, S.H. 1426	3.92	Asphalt Concrete	$7,000 Plans $5	133,000
DISTRICT No. 2, L. Ketchum, District Engineer 109 No. Genesee Street, Utica 1 New York						
Herkimer (Rte. 28)	FARC 60-22	Richfield Springs-Getman Corners, Pt. 2, S.H 1818 Project S-493(1)	6.17	Asph. Conc Type 1A=6.12 Mi. Misc. Work=0.05 Mi.	$51,000 Plans $5	928,000
Madison & Oneida (Rte. 31)	FATS 60-5	Oneida Lake-South Bay, Oneida-South Bay, Pt. 2, S.H. 1361; Canastota-South Bay, S.H. 812; Oneida Valley-State Bridge, Pt. 1, S.H. 8367; Oneida Valley-State Bridge, Pt. 2, S.H 8367; State Bridge-Verona Sta., SH. 8432 Project F-540(3)	7.12	Traffic Signs	$350 Plans $5	6,500
DISTRICT No 3, E E Towlson, Acting District Engineer, 333 E Washington Street, Syracuse, New York						
Cayuga (Rte. 34)	FARC 60-34	Fleming-Scipio, Pt 2, S.H. 1327A Venice Center-Genoa, S.H. 1414 Project F-1155(3)	8.92	Asphalt Concrete	$23,000 Plans $5	421,000
Cayuga (Rte. 34)	FARC 60-36	Genoa-North Lansing, S.H. 1566 Project F-1155(1)	4.95	Asph. Conc., Type 1A Conc. Box-Twin Span 15' Each	$47,000 Plans $5	830,000
Cayuga (Rte. 34)	FARC 60-1	Weedsport-Cato, S.H. 686 Project F-1114(6)	0.48	Grading & Drainage	$13,000 Plans $5	242,000
Tompkins (Rte. 13)	R.C. 60-47	Cayuta-Newfield, S.H. 5474 Ithaca-Newfield, S.H. 5214	1.85	Asphalt Concrete	$3,000 Plans $5	53,000
Wayne (Rte. 31)	FARC 60-37	Pittsford-Palmyra, Pt. 4, S.H. 1551 Project F-744(7)	1.87	Asphalt Concrete	$5,500 Plans $5	100,000
DISTRICT No. 5, E. G. H. Youngmann, District Engineer, State Office Bldg., 65 Court Street, Buffalo 2, New York						
Erie (Int Tour Rte. 190)	N.T. 60-1	New York State Thruway, Niagara Section Sub N-88 (South Grand Island Bridge and Approaches)	1.40 (0.34 Acc.)	9" Cem. Conc. Pavt. 25' & Var.=1.26 Mi. (Plus 0.34 Mi Conc Access); Misc Work=0 14 Mi ; Cant Deck Truss & Gird Br 27 Sp 3383 1' Toll Plaza & Facilities	$435,000 Plans $100 Full Size Only	7,925,000
DISTRICT No 6, J H Thomas, District Engineer, State Office Bldg, 30 West Main Street, Hornell, New York						
Allegany (Rte. 21)	R C 60-35	Andover-Alfred Station-Almond, S H 5502	6.61	Asph Conc =4 61 Mi Misc Work=2 00 Mi	$22,000 Plans $5	397,000
Schuyler (Rte. 224)	FARC 60-31	Montour Falls-Alpine, Pt 1 S H 1232; Montour Falls-Alpine, Pt 2 S H 999; Odessa-Mecklenburg, Pt 1 S H 1655 Project F-FG-479(15), F-400(6)	4.55	Asph Conc =4 54 Mi ; Misc Work=0 01 Mi ; Cant Welded Girds Comp 3 Pc 290 5' Total; R R G S Single Span Pl Gird 84 2'	$116,000 Plans $5	2,107,000
Steuben	FASS 60-22	Purdy Creek-Shovel Hollow C R 28 Project S-541(1)	0.61	Asphalt Concrete	$7,000 Plans $5	120,000
DISTRICT No 7, R W Sweet, District Engineer, 444 Van Duzee Street, Watertown, New York						
Jefferson (Rtes. 11, 12, 37)	T C 60-2	Watertown-Clayton, Pt 1 S H 5140 Watertown-Theresa, Pt 1 S H 565 Watertown-Philadelphia, Pt 1 S H 5651	....	Traffic Signals	$500 Plans $5	$8,500
District No 8, K G Rauer, District Engineer, Pleasant Valley Road, Poughkeepsie, New York						
Columbia	FASS 60-3	Old Chatham-Rayville-Brainart, C R 78 Project S-569(1)	4.67	Calcium Chloride Treated Stabilized Gravel	$30,000 Plans $5	548,000
Columbia & Dutchess	R C 60-29	24 various Highways in District 8 on Routes 9G, 82A, 343, 82, 52	91.2	Subsealing Cem Conc Pavt	$6,000 Plans $5	106,000
Orange & Ulster	R S 60-28	19 Various Highways in District 8 on Routes 6, 9W, 17A, 32, 52, 84, 94, 207, 209, 210	83.63	Subsealing Cem Conc Pavt	$6,000 Plans $5	103,000
Westchester (Int. Tour Rte 87)	FITATS 60-1	New York State Thruway Southern Westchester Conn Sub 11 (N Y City Line-Tuckahoe Road) Hudson Section-Sub. 10 (Tuckahoe Rd. Tarrytown) Project I-87-2(15)	11.00	Traffic Signs	$9,000 Plans $5	159,000
DISTRICT No 9, J C Frederick, District Engineer, 71 Frederick Street, Binghamton, New York						
Broome (Int. Tour Rte. 81)	FITS 60-4	Interstate Route 505 S H No Fish 60-3P (Pennsylvania State Line to Route 17 at Five Mile Point) Project I-81-1(7)	7.49 (3.54 Acc.)	Traffic Signs and Delineators	$1,600 Plans $5	28,000
Broome (Int. Tour Rte 81)	FISH 60-3P	Interstate Route 505 Pennsylvania State Line-Five Mile Point (Penn -N Y State Line to Sunset Drive) Project I-81-1(6)	7.49 (1.24 Acc.)	9" Cem Conc Pavt 2 @ 24' Var =7 29 Mi ; Misc Work=0 20 Mi (Access Cem Conc Pavt 0 77 Mi ; Asph Conc 0 47 Mi)	$145,000 Plans $5	2,645,000
Broome (Rte. 79)	R C 60-48	River Road-Windsor, Pt 2, S H 213; Ouaquaga Road, S H 212; Harpursville-Ouaquaga, S H 1106	4.77	Asphalt Concrete	$11,000 Plans $5	187,000
Delaware (Rte. 10)	FARC 60-32	Walton Village: Delaware St, S H 9268; Rock Rift-Colchester, S H 1271; Colchester-Delancey, S H 1272 Project F-845(5)	5.56	Asphalt Concrete	$70,000 Plans $5	1,187,000
Delaware (Rel. Rte 10)	BWS 60-2	City of New York: Board of Water Supply Road No 1 (Cannonsville Reservoir)	6.04 (1.23 Acc.)	Asph Conc =7 17 Mi Misc Work=0 10 Mi	$190,000 Plans $5	3,436,000
Delaware (Rte. 30)	R C 60-40	Roxbury-Grand Gorge, S H 5459	5.66	Asphalt Concrete	$14,000 Plans $5	235,000
Sullivan (Rte. 17)	FATS 60-6	Monticello-Liberty, Pt 1 S H 5035 Monticello-Liberty, Pt 2 S H 5322 Project F-336(21); F-495(15)	8.02 (7.03 Acc.)	Traffic Signs and Delineators	$3,000 Plans $5	51,000
DISTRICT No 10, M E Goul, District Engineer, 325 W Main Street, Babylon, L I, New York						
Suffolk	SSPRC 60-1	Southern State Parkway (Captree State Parkway to Heckscher State Parkway)	1.37 (1.43 Acc.)	8" Cem Conc. Pavt. 2 @ 37.5' & Var.=1.28 Mi.; Misc. Work=0.09 Mi.; Acc. 8" Cem. Conc. Pavt.=1.43 Mi; 5 Hwy. Gr. Sep. 2 Conc. Rigid Frames 70' & 67' 2 Comp. WF Beams 67.8' & 73.4'; 1 Plate Girder 109' Span	$195,000 Plans $5	3,557,000

Any projects in this letting that are on the Federal Aid highway systems are subject to the provisions of the "Federal-Aid Highway Act of 1956", being Public Law 627, 84th Congress, approved June 29, 1956, and are also subject to the applicable New York State statutes.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage), Public Law 627, the minimum wages to be paid laborers and mechanics are included in wage schedules that are set out in the bid proposal.

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

The deposit for Plans and Proposal Forms for each contract is indicated above. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "Information for Bidders" in the Public Works Specifications, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as Amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bond shall conform to the provisions of the Highway Laws, as set forth in "Information for Bidders".

The right is reserved to reject any or all bids.

J. BURCH McMORRAN
SUPT. OF PUBLIC WORKS

OFFICIAL PROPOSALS

Bids: May 4, 1960

Charlotte-Hopper Hollow Project Trunk Sewers and Force Main

NOTICE IS HEREBY GIVEN that sealed proposals for the "Charlotte-Hopper Hollow Project, Trunk Sewers and Force Main", will be received by the City of Rochester Purchasing Agent at his office, Room 36, City Hall, No. 20 South Fitzhugh Street, Rochester 14, New York, until 11:00 o'clock A.M. Eastern Daylight Saving Time on May 4, 1960, at which time and place they will be publicly opened and read aloud. The proposals shall be for furnishing all materials, equipment and labor for the construction and erection of sewers, force main, and appurtenances, in accordance with the Plans, Specifications and other Contract Documents, prepared by Nussbaumer, Clarke & Velzy, Consulting Engineers for the City of Rochester.

The work is subdivided into four separate Divisions as follows:

Division "E"—Hopper Hollow Trunk Sewer
Division "F"—Beach Avenue Trunk Sewer
Division "G"—Genesee River Crossing
Division "H"—Irondequoit Force Main

Contractors may submit proposals for any one, all four, or any combination of the Divisions.

These Plans, Specifications and other Contract Documents may be examined at the office of Nussbaumer, Clarke & Velzy, 327 Franklin Street, Buffalo 2, New York, and 500 Fifth Avenue, New York 36, New York, and may be examined and copies thereof may be obtained at the office of the Purchasing Agent. One copy of the said documents may be obtained upon payment of $75.00 deposit; any bidder returning such copy in good condition within thirty (30) days following the opening of proposals will be refunded $75.00 and any nonbidder so returning such copy will be refunded $37.50.

The City of Rochester reserves the right to reject any or all proposals, and to waive any informalities, and to make an award to other than the low bidder, should the best interest of the City thereby be promoted.

Proposals shall be made on the form provided in the Contract Documents, and each proposal shall be accompanied by a certified check made payable to the City of Rochester, New York, in an amount not less than five per cent (5%) of the total amount of the proposal, conditioned that the bidder will execute the Contract and deliver the required Performance Bond for the proposed work within ten (10) calendar days after the date of written notice that his proposal has been accepted.

For proposals with total amounts in excess of $200,000.00, or proposals for work financed or aided by any Federal or State Agency, a bid bond in the amount of five per cent (5%) of the amount of the proposal, in proper form, executed by a surety company acceptable to the City, will be accepted in lieu of the aforesaid certified check.

A bidder may not withdraw his proposal within forty-five (45) calendar days after the opening of proposals, but may withdraw his proposal at any time prior to the scheduled time for the opening of proposals.

Kenneth E. Punnett
Purchasing Agent
City of Rochester, New York

Dated: March 30, 1960

District of Columbia—Highway Construction—Dept. of Highways & Traffic, March 18, 1960. PAVING AND WIDENING THE ROADWAY OF RHODE ISLAND AVE. BETWEEN 14TH ST. N.E., AND D. C. LINE (FEDERAL AID PROJECT NO. U-30(7), consisting of approx. 57,000 sq. yds. Reinforced Portland Cement Conc. Base 10" depth; 64,500 sq. yds. Sheet Asph. Pavement including Asphaltic Conc. Binder; and 11,700 lin. ft. Combination Port. Cement Concrete Curb and Gutter 15" depth, (Invitation No. C-6059-H). Wage Rates have been predetermined by Labor Dept. "Pre-bid meeting will be held to answer questions bidders may have on this project on April 4, 1960, at 2:00 PM, EST, Rm. 500, District Bldg., 14th and E Sts., N.W., Wash. 4, D. C." Bid forms, plans and specifications are now available from Supervisor, Bid & Contract Div., Procurement Office, D. C., Rm. 404, 499 Pa. Ave., N.W., upon deposit of a certified check for $40.00 per set, payable to D. C. Treasurer (Phone NA 8-6000, Ext. 2378). SEALED BIDS to be opened 3:00 PM, EST, April 7, 1960, in Rm. 424, 499 Pa. Ave., N.W.

OFFICIAL PROPOSALS

Bids: April 12, 1960.

Venturi Meters

CONTRACT 458

SEALED BIDS will be received by the Board of Water Supply, at its offices, thirteenth floor, 120 Wall Street, New York City, until 11:00 A.M., Eastern Standard Time, on Tuesday, April 12, 1960, for Contract 458, for furnishing, testing and delivering stainless steel venturi meters, together with their instrument assemblies and appurtenances, complete in every respect and ready for installation, all as set forth in the specifications. One 143-inch by 102-inch venturi meter and one 24-inch by 18-inch venturi meter will be required for the Release Water Works at the Cannonsville dam, and one 108-inch by 72-inch venturi meter will be required for the Outlet Works of the West Delaware tunnel.

No bid will be received and deposited unless accompanied by a certified check upon a National or State bank, drawn and made payable to the order of the Comptroller of The City of New York, in the amount of fifteen thousand dollars ($15,000.00), for the proper execution of the Contract.

Pamphlets containing information for bidders, forms of bid and contract, specifications, contract drawings, requirements as to surety, etc., can be obtained in the Secretary's office, Room 1312, at the above address, upon application in person or by mail, by depositing the sum of $5.00 for each pamphlet. Within 30 days following the award of contract or rejection of bids the full amount of such deposit will be refunded for each pamphlet submitted as a bid and a refund of $4.00 will be made for each other pamphlet returned in acceptable condition. Arrangements will be made whereby prospective bidders desiring blueprints of the contract drawings for their own use may secure same, the cost thereof to be paid by them. For further particulars apply at the office of the Chief Engineer, at the above address.

ARTHUR C. FORD, President, EDWARD C. MAGUIRE, HERBERT M. ROSENBERG, Commissioners; Board of Water Supply; BETTY COHEN, Acting Secretary.

Bids: April 14, 1960

Construction of Water Transmission Main

Notice is hereby given that sealed bids will be received in accordance with the law by the Erie County Water Authority until ten o'clock A.M. Eastern Standard Time on the fourteenth day of April, 1960 at the office of the Authority, 338 Ellicott Square Building, Buffalo 3, New York, for furnishing materials and performing the labor for constructing a thirty-six (36") inch diameter water transmission main in the Towns of Orchard Park, West Seneca, Elma, Lancaster, Cheektowaga and the Village of Depew, Erie County, New York, all in accordance with plans and specifications prepared by Buck, Seifert and Jost, Consulting Engineers, 112 East 19th Street, New York 3, New York.

Copies of the plans and specifications may be obtained either from the Erie County Water Authority or from the Consulting Engineers upon deposit of Twenty-five ($25.00) Dollars, which sum will be refunded upon return of the plans and specifications in good condition within ten (10) days after the date on which bids are received or else the entire deposit will be forfeited.

The work to be done includes all materials and labor, tools, plant and equipment necessary for constructing, installing, testing, and completing, ready for operation, approximately sixty-one thousand five hundred (61,500') feet of thirty-six (36") inch diameter water transmission main with connections to existing mains, valves, air relief and blow-off facilities, manholes and other accessories and appurtenances.

Each proposal must be accompanied by a certified check payable to the Erie County Water Authority or a bid bond to the favor of the Authority from a reliable surety company authorized to do business in the State of New York and satisfactory to the Authority, in amount equal to ten (10%) percent of the proposal. The certified check will be retained to pay for any damage or loss to the Authority, or the liability bond will accrue, in case the successful bidder shall neglect or refuse to enter into a contract in accordance with his proposal.

The Authority reserves the right to consider bids for thirty (30) days after their receipt before awarding any contract and the right is reserved to accept any bid or to reject any or all of them.

ERIE COUNTY WATER AUTHORITY
By: WILLIAM J. CARNEY
Secretary

Buck, Seifert and Jost
Consulting Engineers

Dated: March 24, 1960

OFFICIAL PROPOSALS

Bids: April 21, 1960

Electrical Work at the Tuscarora Power Plant, Lewiston, Niagara County, New York

POWER AUTHORITY OF THE STATE OF NEW YORK
ADVERTISEMENT FOR PROPOSALS
SPECIFICATION NO. PA-N-25032
NIAGARA CONTRACT NO. N-27

NOTICE TO CONTRACTORS: The Power Authority of the State of New York will receive sealed proposals for the electrical work at the Tuscarora Power Plant and appurtenant works, located in Lewiston, Niagara County, New York, until 10:30 A.M. Eastern Standard Time on the 21st day of April, 1960, at the Authority's Office, 18th Floor, The Coliseum Tower, 10 Columbus Circle, New York 19, New York, at which time and place the proposals will be publicly opened and read aloud.

The work includes but is not limited to the installation of Authority furnished equipment and materials consisting of all generator/motor auxiliaries, main power transformers, isolated phase bus, generator/motor air circuit breakers, secondary unit substations, motor control centers, unit control boards and appurtenances, control batteries and associated equipment, lighting systems, and insulated wire and cable; the furnishing and installing of miscellaneous electrical equipment, conduit and grounding, and cable trays; and making electrical connections to equipment of a basically non-electrical nature such as pumps, air compressors, heating, air conditioning and ventilating fans including electric duct heaters, hoists and elevators, transformer fire protection equipment and other equipment installed or furnished and installed by others.

The work shall be completed on or before June 15, 1963.

Plans, Specifications and Proposal Forms for the work may be obtained from the Power Authority of the State of New York, 18th Floor, The Coliseum Tower, 10 Columbus Circle, New York 19, New York, upon application and prepayment of a fee of Twenty Dollars ($20.00) per initial set of contract documents, and Ten Dollars ($10.00) per set for additional sets, no part of which will be refunded. Plans, Specifications and Proposal Forms for the work will be on file in the Authority's Office and in the offices of the Engineer, Uhl, Hall & Rich, 230 Congress Street, Boston 10, Massachusetts, and may be inspected by prospective bidders during office hours.

Bids must be made and returned in duplicate in accordance with instructions contained in the Information for Bidders. Guarantee will be required with each bid in an amount not less than 20 per cent of the gross sum bid.

The right is reserved to reject any or all bids.

W. S. CHAPIN
GENERAL MANAGER

PA-N-25032

District of Columbia, Building Construction—Dept. of Buildings & Grounds, March 22, 1960. CONSTRUCTION OF THE HOSPITAL REPLACEMENT AT THE DISTRICT OF COLUMBIA REFORMATORY, NEAR LORTON, VIRGINIA, (INVITATION NO. C-60136-B). Bid forms, plans and specifications are now available from Supervisor, Bid & Contract Division, Procurement Office, D. C., Rm. 404, 499 Pa. Ave., N.W., upon deposit of a certified check for $50.00 per set, payable to D. C. Treasurer. (Phone NA 8-6000, Ext. 2378). SEALED BIDS to be opened 3:00 PM, April 19, 1960, in Room 424, 499 Pa. Ave., N.W.

READ THE OFFICIAL PROPOSAL COLUMN OF
ENGINEERING NEWS-RECORD
THIS WEEK AND EVERY WEEK

OFFICIAL PROPOSALS

ids: June 1960

Kingdom of Thailand Royal Irrigation Department Bangkok, Thailand

NVITATION FOR BIDS—NO. YS-2-18
The Royal Irrigation Department of the ingdom of Thailand hereby invites sealed ritten bids for furnishing and delivering e following goods, equipment, and ma-rials either fob Contractor's shipping oint or cif Bangkok Wharf, Thailand, for e Bhumiphol Power Plant, Yanhee Multi-urpose Project, Kingdom of Thailand, in ccordance with the Contract Documents, r furnishing:

Two (2)	115 metric ton, single-trolley, motor-operated overhead traveling cranes, each with a 20 metric ton auxiliary hoist, and complete with rails, catwalk and appurtenances.
One (1)	9 metric ton gantry crane, motor operated, complete with rails and appurtenances.
One (1)	lot of draft-tube-gate-slot gratings and frames.

Invitations for Bids will be issued in pril, 1960, and will be opened in June, 960. Copies of Contract Documents, Invi-ation for Bids—No. YS-2-18, Overhead raveling Cranes, Gantry Crane, Rails and liscellaneous Metal Work, may be obtained y qualified Bidders on written request to:

Royal Irrigation Department
Attention: Thai Liaison Engineer
c/o Engineering Consultants, Inc.
1901 South Navajo Street
Denver 23, Colorado

Each request must be accompanied by a heck or money order, payable to the Royal rrigation Department, in the amount of . S. $10.00 for each copy of the Contract ocuments requested. The remittance is onreturnable.

M. L. Xujati Kambhu
Director General
Royal Irrigation Department
Kingdom of Thailand
Bangkok, Thailand

U. S. Government

EPARTMENT OF THE INTERIOR, Bu-eau of Reclamation. Sealed bids (Speci-ications No. DC-5310) will be received at lbuquerque, New Mexico, until 10 a.m., Mountain Standard Time, May 12, 1960, for urnishing labor and materials for earth-ork, clearing, and structures for irriga-ion rehabilitation Albuquerque Unit 4, Middle Rio Grande Project, New Mexico. ocation near Albuquerque, New Mexico. rincipal items are, lump sums—clearing nd cleaning waterways; 73,000 cu. yds. xcavation; 223 cu. yds. concrete in struc-ures; 55 turnouts—furnishing and con-tructing farm turnouts; 3,354 lin. ft. urnishing and laying pipe; and other work. ompletion date March 15, 1961. For par-iculars, address Bureau of Reclamation, . O. Box 252, Albuquerque, New Mexico; . O. Box 1609, Amarillo, Texas; or Build-ng 53, Denver Federal Center, Denver 25, olorado. Floyd E. Dominy, Commissioner.

EPARTMENT OF THE INTERIOR, Bu-eau of Reclamation. Sealed bids (Speci-ications No. DC-5295) will be received at Huron, South Dakota, until 10 a.m., Central Standard Time, May 3, 1960, for furnishing abor and materials for Fort Thompson Substation, Stage 01, Transmission Division, outh Dakota, Missouri River Basin Project. ocation near Highmore, South Dakota. rincipal items are 53,200 cu. yds. excava-ion; 1,560 cu. yds. concrete; Lump sum, onstructing service building; Lump sum, onstructing warehouse; 370,000 pounds, urnishing and erecting substation steel tructures; 440,200 pounds, furnishing and recting transmission line approach towers; transformer, installing 20,000 kva power ransformer; 14 breakers, installing 69- and 30-kilovolt power circuit breakers; and ther work. Completion time 515 days. For articulars, address Bureau of Reclamation, . O. Box 2553, Billings, Montana; P. O. ox 825, Huron, South Dakota; or Buildng 1, Denver Federal Center, Denver 25, olorado. Floyd E. Dominy, Commissioner.

Contractors Watch This Section—

for new projects. Publish your announcements through the proposal sections of *Engineering News-Record* and get their bids.

OFFICIAL PROPOSALS

Bids: April 19, 1960

Newark Airport—Navigational Aids

THE PORT OF NEW YORK AUTHORITY

Sealed proposals for the following work will be received at the Office of the Chief Engineer, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on date indicated, at which time said proposals will be opened and read in Room 1108.

Contract NA-220.016—Newark Airport—Navigational Aids—Runway 11-29—Deposit $30.00 per set of documents—Bids will be received until 2:30 P.M. on Tuesday, April 19, 1960.

Contract documents may be seen at the Office of the Assistant Chief Engineer for Design, Room 1115, 111 Eighth Avenue, New York 11, N. Y. Documents will be furnished upon receipt of the above deposit (each set including one copy of the Contract Drawings) for not more than three sets to any one company. Additional sets will be furnished upon payment of an amount for each set equal to the deposit indicated above, which payment is not returnable. Deposits and payments shall be delivered to the Treasury Department, Room 1001, where a receipt will be issued. The receipt shall be delivered to Room 1115, where the documents will be furnished.

Those who have submitted a bid on the contract directly to the Authority will receive a refund of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals. Those who have not submitted a bid will receive a refund of one-half of the deposit for each set of documents, not exceeding three returned within forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
S. Sloan Colt, Chairman

New York, March 31, 1960

Bids: May 4, 1960

Charlotte-Hopper Hollow Project Sewage Pumping Stations and Appurtenances

NOTICE IS HEREBY GIVEN that sealed proposals for the "Charlotte-Hopper Hollow Project, Sewage Pumping Station and Appurtenances", will be received by the City of Rochester Purchasing Agent at his office, Room 36, City Hall, No. 20 South Fitzhugh Street, Rochester 14, New York, until 11:00 o'clock A.M. Eastern Daylight Saving Time on May 4, 1960, at which time and place they will be publicly opened and read aloud. The proposals shall be for furnishing all material, equipment and labor for the construction and erection of structures and appurtenances, in accordance with the Plans, Specifications and other Contract Documents, prepared by Nussbaumer, Clarke & Velzy, Consulting Engineers for the City of Rochester.

The work is subdivided into four separate Divisions, as follows:

Division "A"—Structures, Equipment, Outside Piping and Site Improvements.
Division "B"—Heating and Ventilating
Division "C"—Electrical Equipment and Work
Division "D"—Plumbing.

Contractors may submit proposals for any one, or more of the divisions for which they are qualified to bid by law.

These Plans, Specifications and other Contract Documents may be examined at the office of Nussbaumer, Clarke & Velzy, 327 Franklin Street, Buffalo 2, New York, and 500 Fifth Avenue, New York 36, New York, and may be examined and copies thereof may be obtained at the office of the Purchasing Agent. One copy of the said documents may be obtained upon payment of $75.00 deposit; any bidder returning such copy in good condition within thirty (30) days following the opening of proposals will be refunded $75.00, and any non-bidder so returning such copy will be refunded $37.50.

The City of Rochester reserves the right to reject any or all proposals, and to waive any informalities, and to make an award to other than the low bidder, should the best interest of the City thereby be promoted.

Proposals shall be made on the Form provided in the Contract Documents, and each proposal be accompanied by a certified check made payable to the City of Rochester, New York, in an amount not less than five per cent (5%) of the total amount of the proposal, conditioned that the bidder will execute the Contract and deliver the required Performance Bond for the proposed work within ten (10) calendar days after the date of written notice that his proposal has been accepted. For proposals with total amounts in excess of $200,000, or proposals for work financed or aided by any Federal or State Agency, a bid bond in the amount of five (5) per cent of the amount of the proposals, in proper form, executed by a surety company acceptable to the City, will be accepted in lieu of the aforesaid certified check.

A bidder may not withdraw his proposal within forty-five (45) calendar days after the opening of proposals, but may withdraw his proposal at any time prior to the scheduled time for the opening of proposals.

Information concerning materials and equipment when requested, must be furnished with bid. Failure to do so will result in bid being declared informal.

Kenneth E. Punnett
Purchasing Agent
City of Rochester, N. Y.

Dated: March 30, 1960.

OFFICIAL PROPOSALS

EMPLOYMENT OPPORTUNITIES

Send NEW Ads and Inquiries to Classified Advertising Division of ENGINEERING NEWS-RECORD, P. O. Box 12, N. Y. 36.

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. Box 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

• POSITIONS VACANT

Sales Engineer—Civil, Highway product, major corporation, locate one of several points East Coast. Experience in highway construction or with Highway Department desirable. In applying state full qualifications and experience. P-3875, Engineering News-Record.

Prestressed Concrete Sales Engineer: To represent established expanding prestressed concrete plant in Denver, Colorado. Structural design background helpful. Desire top man as first assistant to managing director and capable of full charge. Salary open, profit sharing plan, vacation. Send complete resume. Strictly confidential. Craftsmen Construction Company, 1337 E. 18th Ave., Denver, Colorado.

Estimator—Heavy Construction. Expanding mid-west industrial, institutional commercial firm with nine state operation. Opening for man (25-35) thoroughly experienced in competitive public bidding. Must have take-off, price and sub-contract ability. Send complete resume. All applications held in strict confidence. Our employees know of this ad. P-3938, Engineering News-Record.

General Manager—Civil Engineer. Immediate opening for qualified take-charge applicant in leading commercial and industrial general contractor's organization, located in Arizona. Will be responsible over estimating, bidding, purchasing, subcontracting and organizing projects. State experience, resume, references and salary range. P-3937, Eng. News-Record.

Office-Manager and Controller. Leading south-western U. S. Building Construction Firm has immediate opening for qualified applicant experienced in controllership functions, C P A desirable. Background of General Contracting Accounting Methods very essential. Submit resume, detailing education, experience, references and salary range. P-3944, Engineering News-Record.

Wanted—Project Engineers and Construction Superintendents: Long established midwest general construction firm anticipates openings immediately. Project engineers must be aggressive, tactful, familiar with material controls, owner and architect relations, processing of shop drawings, material samples, change orders, and other details necessary to properly schedule and coordinate material flow to jobsite. Engineering degree preferred but not mandatory. Construction Superintendents must be aggressive, cost conscious, and well experienced in reinforced concrete, structural steel, and masonry structures. Engineering background preferred but not mandatory. Applicants for either position should furnish complete resume of experience and education with salary expected in initial reply. P-3982, Engineering News-Record.

(Continued on the following page)

EMPLOYMENT NATIONAL COVERAGE OPPORTUNITIES

DISPLAYED RATE:

The advertising rate is $39.20 per inch for all advertising appearing on other than a contract basis. Frequency rates quoted on request.

An advertising inch is measured ⅞" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

APRIL 14TH ISSUE
CLOSES
APRIL 4TH

UNDISPLAYED RATE:

$2.40 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted ads, take ½ of above rate.

Box numbers—count as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to agency Commission.

Send NEW Ads and Inquiries to Classified Advertising Division or ENGINEERING NEWS-RECORD, P. O. Box 12, N. Y. 36.

• POSITIONS VACANT

(Continued from preceding page)

Highway Design Engineer, graduate with minimum of 2 years recent highway and structures design experience, for permanent opening in Chicago Office of established consulting firm. Send detailed resume with salary requirements to P-3942, Engineering News-Record.

Wanted: Structural Designer with approximately 8 years drafting and design experience in reinforced concrete and structural steel frame buildings. For more details send complete resume to Sollitt Construction Company, Inc., 301 Columbia Street, South Bend (24), Indiana.

York, Pennsylvania—Planner—Excellent salary Opportunity—Position of responsibility with large Engineering-Architectural firm. Qualifications—Degree in planning or allied professions with 2 to 4 years experience. Immediate assignments. Personnel Director—Buchart Engineering, 55 South Richland Ave., York, Penna.

Construction Superintendent CE Georgia to handle various jobs in state. Must be experienced public works. Salary commensurate with experience and ability. Send resume P-3919, Engineering News-Record.

Construction Contract Administrator — Expeditor, etc. Must be familiar with public works—good opportunity for right man. Send resume to M.K., 53 Seawane Rd., E. Rockaway, N.Y.

Equipment Superintendent: To organize and manage prevention, maintenance and repair of heavy construction equipment. Midwest location. P-4085, Engineering News-Record.

Estimator—Expanding Philadelphia Contractractor has an opening for a man thoroughly experienced in competitive public bidding. Top pay and working conditions. Wingate Construction Company, 34 So. 17th Street, Phila., 3, Penna.

Assistant Town Engineer-Civil-Degree or some College preferred—age 20-30. Salary $4,900.00—$5,400.00. Small New England Town—population 9,000. Write, giving full resume and date available to P-4062, Engineering News-Record.

Civil Engineer—Registered Professional Engineer capable of performing engineering and administrative duties required of City Engineer. Salary open. Send resume of educational and work experience background and salary requirements to Mayor J. Fred Kinley, City Building, Corry, Pennsylvania.

Assistant to City Engineer—Capable of performing administrative and supervisory duties in connection with municipal public works program. Ability to handle survey and drafting duties also desirable. Salary open. Send resume of educational and work experience background and salary requirements to Mayor J. Fred Kinley, City Building, Corry, Pennsylvania.

Superintendent—Bureau Water And Sewers. Batavia, New York. Graduate in sanitary engineering from a university of recognized standing with some experience in municipal and related fields. Will be responsible for water treatment and distribution operations; sewage treatment facilities and pumping stations. Salary open. Send resume and application to City Administrator, City Hall, Batavia, New York.

Job Superintendent—Mainly man experienced in Building work. At present have openings in various locations. Please submit complete resume with salary requirements to P-4028, Engineering News-Record.

• POSITIONS VACANT

Wanted: Road Grader Operators. We are interested in securing two top road grader operators for work on state highway contracts in North Central Illinois. We will guarantee sufficient work for the entire 1960 season at union wages. Please contact P-4072, Engineering News-Record, as soon as possible.

Retired Structural Engineer. Guide installation of Structural Section in Established Engineering Practice Midwest University City. P-4073, Engineering News-Record.

Engineers—Wanted to fill positions as Assistant Sanitary Engineer with New York State Agencies throughout the State in environmental sanitation or public health engineering. Requires Engineering degree and one to two years of responsible experience and/or graduate work in sanitary or public health engineering. Salary $6410 to $7760 in five annual increases. For detailed information write to Recruitment Unit, Box 30, New York State Department of Civil Service, The State Campus, Albany 1, N. Y.

Mechanical Engineers. Have openings for process and piping engineers with established consulting firm. Permanent positions. Submit resume of experience, references, and salary expected to Patchen, Mingledorff and Williams, Consulting Engineers, 830 W. Peachtree St., N.W., Atlanta, Georgia.

Wanted: Reinforcing Steel Detailer with at least two (2) years experience. Excellent starting salary. Permanent employment and liberal benefits. New plant and office in Pennsylvania area. Replies kept in strict confidence. P-4064, Engineering News-Record.

Design Engineer—Civil or Sanitary for water and sewerage projects. Perm. Pos., vac. and sick leave. Loc. Maryland. Submit resume and salary requirements to Anne Arundel County San. Comm., P.O. Box 128, Glen Burnie, Maryland.

Creative Structural Engineer. To participate in analytical development of advanced reinforced and prestressed concrete structures. Work includes design development, technical writing and opportunities for engineering consultation and lecturing before professional groups. Small amount of traveling. Degree in Civil Engineering required, with advanced degree in structures desirable. Concrete structural design experience required. Familiarity with prestressing and concrete shells desirable. Must be able to use advanced mathematics as a tool in developing new design methods. Job located at Chicago headquarters of a national engineering organization. Excellent working conditions and advancement opportunities. Salary commensurate with experience and ability. Maximum age forty. Submit complete outline of background and experience. P-4058, Engineering News-Record.

• POSITIONS WANTED

Estimator-Superintendent—15 years one Company. Thoroughly qualified to handle complete job bidding stage to completion. Sewage Disposal, Water Treatment, all types Heavy Construction. Will relocate to suit job. Best of references. PW-3913, Engineering News-Record.

Grade Supt. Highways. Flood Control, Air Base. Midwest-Eastern or Foreign location O.K. Age 45. P.O. Box 123, Campbell, California.

Elect. Const. Supt. or Ass't. Supt. Overseas. 13 yrs. exp. heavy industrial const. Min. Sal. $12,000 per yr. Contact J. M. McBride, 106 E. Cooke, Glenolden, Pa. LUdlow 6-7131.

• POSITIONS WANTED

Construction Superintendent. Experienced Hospitals, schools, banks, industrial, commercial buildings and high rise public housing. Quantity take-off, from bidding to final completion. PW-3868, Eng. News-Record.

Construction Man; Age 35—15 years experience. Supervisory, Heavy and Highway. Resume on request. PW-3867, Engineering News-Record.

Contracts Manager, Project Engineer, Age 41, direct charge of contracts administration, changes, estimating, negotiations and claims settlement. Over 20 years of varied engineering experience with strong mechanical background. Thoroughly competent in office management and field administration. Very good Spanish. Presently located in Europe. Prefer to remain in Europe or relocate in Latin America but open to offer. Available in 90 days. Resume on request. PW-3912, Engineering News-Record.

Highway Construction Superintendent: 20 years experience excavation, grading, etc. Assume full responsibility field and office. PW-3911, Engineering News-Record.

Construction executive C.E. age 37. 12 years experience as civil engineer superintendent, assistant division manager on marine and heavy construction—dredging, pile driving bridge substructures, docks and lock construction including estimating purchasing and cost analysis. PW-3932, Engineering News-Record.

Waterfront—Heavy Construction—Buildings Licensed C.E., over 30 years experience in Design, Estimating, Coordination, Field and Office Supervision. Location immaterial. PW-3933, Engineering News-Record.

Construction Supt. General Construction. PW-8896, Engineering News-Record.

Available Hydraulic Dredge Civil Engineer. Many years experience in field investigation, estimates, consultant. Full time or Project Basis. PW-4024, Eng. News-Record.

Construction Administrator—25 yrs. one large N. Y. Contractor—Registered P.E.-Desire association established engineer consultant or contractor—Northern Jersey preferred but not mandatory—Will invest. PW-3974, Engineering News-Record.

Project Manager, B.S.C.E., 16 yrs. exp. hvy. const., hwys., flood control, earthwork. bldgs., Govt. contracts, field & office, employed. PW-3965, Engineering News-Record.

Executive. C.E. Age 32, 8 years experience heavy, road, pipeline construction, waterworks, plant management, foreign and domestic. PW-4015, Engineering News-Record.

B.S.C.E. Feb., '60, E.I.T. Mo., age 32. Several years experience small fabricator & general contractor. Desire opportunity either field, location open. J. B. Mensch, 704 Maryland, Columbia, Mo.

Engineer (Geol.)—1½ yrs. in superv. of drilling and boring programs, exploration and prop. eval'n. One yr. in general eng. and blasting techs. Age 26 and avail. for travel. PW-4017, Engineering News-Record.

Chicago to Gary area—construction eng. and L.S. desires employment by contractor or land developer. Salary $150 per week. Write P.O. Box 2014, East Chicago, Ind.

Electrical Supt. or assistant Supt. Foreign or Domestic. 20 yrs. exp. in heavy industry maintenance & construction. PW-4093, Engineering News-Record.

(Continued on opposite page)

• POSITIONS WANTED

(Continued from opposite page)

Executive (Female) Contract Manager, Attorney, Administrator, 15 yrs Legal-Construction Experience, Govt Contracts, Claims, Employed. PW-4033, Engineering News-Record.

Project Manager or Superintendent, construction of highways, air-ports or earth moving of any kind. Twenty five years experience, can furnish best of references. Will travel anywhere and am available now. PW-4069, Engineering News-Record.

Construction Engineer, 33, B.S.C.E. 8½ yrs. experience Industrial Construction with General & Mechanical contractors. Can estimate, buy material, select sub contractors negotiate with labor unions & owners, and supervise field construction. Would make a good Man Friday for construction company or construction department of industrial firm. Location preference Mississippi to Rockies. Will consider other areas. PW-4078, Engineering News-Record.

Construction Engineer, 54, Reg. (Pa., Ala.), BSCE, CE. Extensive Heavy, Hydro construction experience. Seeks position with engineer-constructor firm Virginia, South Atlantic States. PW-4079, Engineering News-Record.

Former Consultant, 54, Highly Productive, ample capital, seeks association with established engineering organization, New York area. P-4071, Engineering News-Record.

Superintendent with key men, good experience in all phases of general construction including bidding, moving-in, buying, ocean shipping, production in the Bahamas and Caribbean wants tough project in either area or in Africa or India after May 1. PW-4059, Engineering News-Record.

Superintendent-Estimator-Engineer, CE P.E. L.S. (NJ) experienced public works, utilities, bridges, paving desires position general contractor. PW-4032, Engineering News-Record.

Erection or yard foreman struct. steel 15 years exp. industrial bldgs. Largest tonnage jobs in country. Best references can take complete charge this part contractors work. Prefer midwest locations. Write P.O. Box 28, Paris, Illinois.

Chief Estimator for large midwest contractor desires change. Civil Engineer graduate. 25 years experience. Present salary $14,000. PW-4088, Engineering News-Record.

Design Engineer, 56, experienced Industrial Construction, plant engineering, piping & equipment layout, structural. Will relocate. PW-4090, Engineering News-Record.

Construction—sanitary, storm, and water trunk and lateral lines (pipe and reinforced concrete). Can take complete charge of estimating and supervision. Inquiries answered. Louis F. Savoca. RD#1 Box 79, Sewell, N. J.

B.S.C.E. 30, Construction Superintendent desires management potential position with medium Western heavy and highway contractor. Minimum $12,000. PW-4084, Engineering News-Record.

Engineer. B.S., C.E., P.E., Graduate study. Ten years well rounded responsible experience including structural steel, concrete, and civil engineering for plants, buildings, and highway projects. Want high potential position in New York area. PW-4061, Engineering News-Record.

June Graduate B.S. Business, Married. Desire challenging career in construction field. Five summers with excavating contractor contact Wayne R. Nelson, Greenville College, Greenville, Illinois.

Heavy Equip. Supt. 16 yrs. exp. on all phases. Available 30 days. PW-4060, Engineering News-Record.

English Engineer 30 single 8 yrs. concrete design & constr. esp. bridges 4 countries also teaching exp. MA (Cantab) MS (Mo) AMICE, AMIStruct E, spks Spanish seeks position Latin America write Alcock, Apartado 5228, Panama. R. de P.

• SELLING OPPORTUNITY WANTED

Sales Engineer: Central Florida resident with own office, averaging one million dollar volume annually in Florida for large miscellaneous iron & steel fabricator, requires to represent in addition, a large structural steel fabricator on a draw against commission basis. RA-3904, Engineering News-Record.

Immediate Opening

Building Construction

PROJECT MANAGER

Young, rapidly expanding ($70 million in active contracts) nationwide construction company wishes to discuss your qualifications if you have substantial successful experience as top project manager for general contractor on varied competitively bid individual complex projects (primarily governmental) exceeding $10 million and seek greater future opportunities with growing firm.

Exceptional opportunity to offer a top-flight man now and future potential in top managerial positions as Company adds branch office operations.

Mail complete and confidential resume to Director of Personnel

BLOUNT BROTHERS CONSTRUCTION CO.

Home Offices / 79 Commerce Street / Montgomery, Alabama

Draftsmen—Structural

Experienced checkers and detailers on structural shop drawings for bridges. Write stating age, education and experience. Drawing Room located in Metropolitan New York City area.

P-4039—Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

ENGINEERING QUANTITY SURVEYOR

A long-established heavy contractor has an excellent opportunity for a qualified quantity surveyor or take-off man whose work would largely be centered in the pre-bid quantity analysis of major projects such as dams, structures, tunnels and roads. This is a permanent position with a nationally prominent organization. Salary plus many benefits. Location San Francisco Bay area. Please send your personal and experience record. Your reply will be kept confidential.

P-4046, Engineering News-Record
68 Post St., San Francisco 4, Calif.

HIGHWAY ENGINEERS

For Overseas Assignment

MAINTENANCE ENGINEER
MATERIALS & RESEARCH ENGINEER
PLANNING & DESIGN ENGINEER

Engineering degree necessary—10 years responsible highway engineering experience. Capable conducting lectures, seminars for highway engineers. Also preparation manuals and specifications. Send complete resume, present salary and photograph to

P-4041, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

CONSTRUCTION MANAGER

With heavy experience background in dams, tunnels and hydroelectric projects. Work domestic or foreign. Salary commensurate with experience. Write:

P-3097, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

ENGINEERS

Chemical
Mechanical
Instrumentation
Relocate
to

SAN FRANCISCO

Positions exist for experienced engineers capable of assuming supervisory responsibility on design of major petroleum and/or petro-chemical processing units or related projects.

Liberal relocation allowances to San Francisco for you and your family.

Send confidential resume to:
George I. Copeland
Manager of Personnel

Personal interviews will be arranged for qualified candidates.

BECHTEL CORPORATION

220 Montgomery Street
San Francisco, California

$25,000.00

PER YEAR

Permanent position open with midwest construction company for man with at least five years experience as

Bridge and Structure Superintendent

capable of taking complete charge of $5,000,000.00 annual volume of work.

Give full particulars in initial response. All replies completely confidential.

P-4040, Eng. News-Record
520 N. Michigan Ave., Chicago 11, Ill.

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structural steel engineer

for engineering dept. of highly respected structural steel fabricator and erector in the East. Must have practical experience in erection with technical ability to advance to executive status. We are looking for young col. grad. interested in a permanent connection. Advancement unlimited. Salary Open. Send full resume to:

P-4048, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

ARCHITECTURAL M. E. WANTED

Staff M. E. Architects' office. Experienced design, general M. E. for normal commercial, industrial structures. Profit sharing and benefits. Send resume and salary expected to

FULMER and BOWERS, *Architects*
341 Nassau Street, Princeton, N. J.

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BOX NUMBERS count as one additional line in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads.

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. Box 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

• CONTRACT WORK WANTED

Structural, Sanitary, Civil—Design and Drawing. Licensed Professional Engineers. CWW-3888, Engineering News-Record.

• WANTED

Anything within reason that is wanted in the field served by Engineering News-Record can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

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15-W B.E. Elec. Drag, 215', 12 yd.
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9-W B.E. Diesel Drag, 165', 12 yd.
7-W B.E. Diesel Drag, 140', 7 yd.
7400 Marion Diesel Drag, 175', 13 yd.
7400 Marion Elec. Drag, 175', 12 yd.
625 Page Diesel Drag, 160', 9 yd.
621-S Page Diesel Drag, 125', 7 yd.
200-W B.E. Diesel Drag, 125', 6 yd.
5-W B.E. Diesel Drag, 100', 6 yd.
2400 Lima Elec. Drag, 130', 6 yd.
2400 Lima Diesel Drag, 130', 6 yd.
4500 Manitowoc Drag, 120', 5 yd.
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88-B B.E. Comb. Shovel/Drag, w/100' boom
3900, 3500 & 3000 Manitowoc Cranes
111-M Marion Drag, 100', 4 yd.
1601 Lima 4 yd. Shovel/Drag
1055 P&H Drag, 80', 3½ yd.
1201 Lima Drag, 85', 3 yd.
54-B B.E. Drag, 80', 2½ yd.
5560 Marion 26 yd. Elec. Shovel
5480 Marion 18 yd. Elec. H.L. Shovel
151-M Marion 7 yd. Elec. Shovel
170-B B.E. 6½ yd. Elec. Shovel
4161 Marion 6 yd. Elec. Shovel
2400 Lima 4½ and 5½ yd. H.L. Shovels
120-B B.E. 4 yd. Elec. Shovel
111-M Marion 4 yd. Standard Shovel
1201 Lima & 54-B B.E. Standard Shovels
Model T-650 REICHdrill Trucks Mounted Rotary and Down-The-Hole
Ingersoll-Rand Truck Mtd. & Crawler Mtd. Drillmasters
Euclid Trucks, Rr. & Bottom Dump; Dozers, etc.

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313 Hazleton Nat'l Bank Bldg.
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ONE HUNDRED THOUSAND (100,000) f.b.m. 2" x 10" S4S used once. FORTY THOUSAND (40,000) sq. ft. of ⅝" Plyform used 3 times on one side. Miscellaneous accessories for Span Form Work all excellent condition.

Plans and material for inspection at jobsite.
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for ready-mix concrete plant.
WILLIAMS CONSTRUCTION CO.
Box 5045, Baltimore 20, Md.
Tel: MUrdock 6-1000

Wanted
ASPHALT PLANT
Good used hot mix asphalt plant complete about 25 to 45 tons per hour
Also 75 to 100 ton per hour dryer
GEITZ PAVING CO.
P. O. Box 654 Naples, Florida

FOR SALE
ASPHALT PLANT

Complete 2000# Batch Type all electric asphalt plant with 35 c.y. material bin and 4 compartment hot aggregate bins—Apron feeder—2 dryers (21' x 50" and 24' x 60")—Hot elevator 3 x 6 Heavy Duty Vibrating Screen totally enclosed—Toledo Dial Type aggregate scale—Dust elevator and screw conveyor—2000# steam jacketed pugmill—75 H.P. Steam Boiler with Hopkins Low Pressure Oil Burners—Viking Asphalt Pump—10,000 gal. Asphalt and 10,000 gal. Fuel Oil Tanks

Plant is powered by electric motors and completely wired.

For Information Contact

Mr. Carl Petersen
925 Florida Avenue Off: BEverley 5-0242
Oshkosh, Wisconsin Res: BEverley 1-9068

COMPRESSORS FOR SALE

600' Worthington Piston Type Diesel Driven, Completely Rebuilt, $8500.00. 500' Ingersoll Rand with Rebuilt Murphy Diesel $5500.00. Many others. Gasoline Driven 60' to 315'. Write for Prices.

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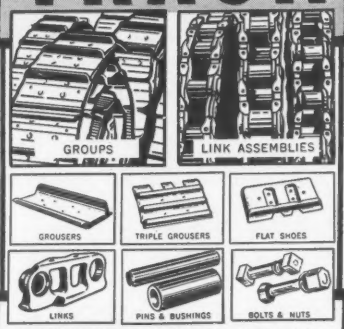

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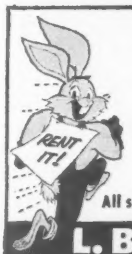

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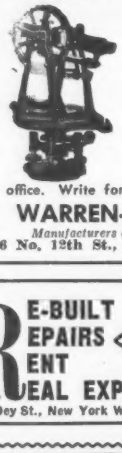

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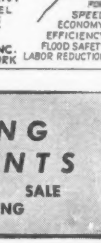

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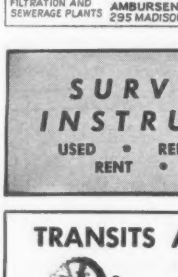

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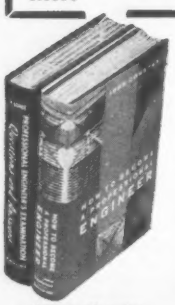

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Fallout Shelter Gamble

A WISE DECISION has been made in New York to seek legislation that would aid and stimulate voluntary construction of nuclear fallout shelters in homes, factories and office buildings, rather than making their construction mandatory. Until last week, Governor Rockefeller had urged the mandatory approach on the recommendation of a special committee he had appointed to study the fallout shelter problem.

In pushing a fallout shelter program as vigorously as he has, Governor Rockefeller has discharged a responsibility of leadership that he keenly and sincerely feels. Nevertheless, he still finds himself largely alone. No such voice as his has been raised on the national level, and none of the governors of the other 49 states has noticeably expressed concern over our lack of shelter preparedness.

All of this seems to mean that the country is not yet ready to take the fallout shelter gamble. Part of the reason may be lack of sufficient information on the protection that shelters would provide, but more important are unresolved doubts that shelters are a logical answer to the situation that the nation faces.

Logic, for example, suggests that no bomb-carrying missiles will be launched against us until they can destroy in one blow every means of retaliation that we have Logic further suggests that, even if such a rain of missiles occurred, so much property would be destroyed and so many persons killed that the U.S. and Europe would be of little use to the victor. Also, from the viewpoint of the people who survived, doubts have even been expressed that survival would be worthwhile if it meant slavery under inhuman conditions.

However, man's will to survival being what it is, the gamble that fallout shelters would provide protection cannot be quickly dismissed. That is why New York's proposal to give people more time to decide if they wish to build shelters—and to provide a tax-relief incentive if they decide to do so—is a wise one. In the meantime, major national effort can continue to be exerted toward building up and protecting our retaliatory strength against attack. That is a much more certain road to survival.

Saving Engineering Manpower

HIGHWAY ENGINEERS AND ADMINISTRATORS have cause to ponder the suggestions offered by contractor John A. Volpe at the Mississippi Valley Conference of State Highway Departments in Chicago on how to save engineering manpower. His recipe: Have more lump-sum contracts, and fewer engineers on inspection.

Unquestionably, Mr. Volpe's views on highway construction carry considerable weight, whether he speaks as the new president of AGC; as a former Commissioner of Public Works in Massachusetts; as the first Federal Highway Administrator; or as the head of his own contracting firm (see cover story, p. 59).

Neither of his suggestions should be construed as favoring the contractor, for it takes additional contractor-estimators to figure quantities and costs on lump-sum contracts. However, savings in manpower could accrue to the highway departments, and much of the detailed cost-keeping by the field engineers could be eliminated.

From the contractor's standpoint also, it should not be overlooked that his responsibility for insuring that the quality of his work is good enough to pass final inspection would be greatly increased. What is really being proposed is that more emphasis be placed on "results" specifications rather than on "methods" requirements.

Combined with proper pre-qualification of bidders, the lump-sum contract and fewer inspectors will, Mr. Volpe contends, not only protect the state highway departments, but also will permit the contractors to exercise their know-how and ingenuity. The result: better work, and lower engineering and inspection costs.

Obviously, lump-sum bids and fewer inspectors would not apply across-the-board on a wide variety of construction contracts. But for those jobs where such procedure shows promise, a closer look or reappraisal of the possible savings in engineering manpower might well be in order.

Foresight in Traffic Planning

ONE OF THE GOOD REASONS for hoping that Brasilia, the new capital city that Brazil is building in the interior, will be a success is that it will test whether planning foresight can cope with the needs of highway traffic. Brasilia's planners had a free hand in laying out the street pattern, in prescribing widths and in selecting intersection designs. For the first time in history all this could be done in the light of what the modern motor car, in its rabbit-like multiplication, can do to upset the best laid plans.

One writer, who visited Brasilia and came away inoculated with enthusiasm, has said that Brasilia, "will be the only capital in the world without a traffic problem." Assuming that Brasilia develops the volume of motor traffic that is considered to mark the success of a capital city, the prospect of seeing it operate without a traffic problem will be impatiently awaited.

So far, success in planning for traffic has usually carried an element of luck with it, as when Brigham Young decreed that Salt Lake City's streets should be unusually wide. Today they serve the motor car admirably, but the original idea was simply to make them wide enough for wagons hauled by six oxen abreast to pass one another. It is to be hoped that the planners of Brasilia have been blessed with similar "foresight."

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